ELECTRICAL REVIEW

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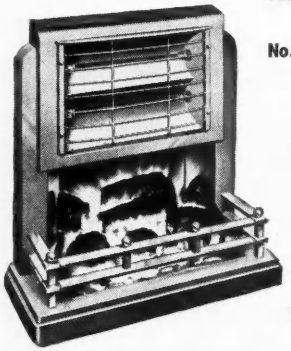

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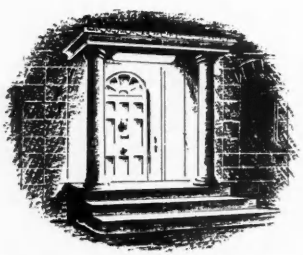

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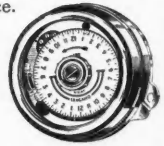

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ELECTRICAL REVIEW

VOL. CXLIX No. 3848 24TH AUGUST, 1951

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

District Heating

RELATIONSHIP WITH ELECTRICITY SUPPLY

AS a by-issue of the deficiency of generating capacity attention is once more being turned to district heating, meaning the use of exhaust steam from turbines in power stations to provide hot water through public mains. Little co-ordinated authoritative information is available on the subject on a large scale.

Technical and Economic Aspects

The forming of balanced views could be aided, as Mr. G. N. Haden suggested in a letter to *The Times* last week, by the general release of a report prepared five years ago by the district heating sub-committee of the Department of Scientific and Industrial Research. In this report a basic scheme for a reconstructed city area was worked out in detail. An earlier interim report of the sub-committee, made generally available, was useful in dispelling illusions as to the extent to which district heating of the type here under consideration is used abroad, as distinct from hot water or steam from any central source unconnected with electricity production. It did little to indicate the magnitude or complexity of the technical and economic aspects of the system.

Data based on experience will no doubt be forthcoming from the Churchill Gardens installation, described in our issue of 3rd August, the first of its kind in this country. Results achieved on a mainly residential estate would not, however, be an infallible guide to conditions in a commercial area, for instance. There the running of large hot water distribution mains in a congested sub-soil and the avoidance of heavy heat losses consequent on cessation of appreciable demand during nights and week-ends in the winter and during five summer months are among further difficulties introduced. Presumably on account of these a report drawn up in 1947 with regard to the City of London was not implemented.

Selling Value

From another angle, Mr. Oliver Lyle made the point that no attempt has apparently been made to ascertain the selling value of district heating—surely a factor of the first importance. Incidentally, we are unable to agree with his contention that, even if there was sufficient plant to meet next winter's demand, there would not be enough coal to run it, but that is outside our present scope. Some of the district heating proposals we have examined assume that " topping up " in very cold weather could be left to electric fires; this would not help to cope with peaks.

Mr. Lyle is on more solid ground, we believe, in giving 5 to 10 MW as the desirable maximum size of thermal-electric stations, since these would have to be in the heart of populated areas. More than 1,600 flats in Pimlico are served by two 1·35 MW special back-pressure turbines in Battersea power station, only 700 yards away. The use of the hot exhaust of gas turbines, advocated by Mr. P. Johnson, would have the merit of not interfering with their efficiency, as would the elimination of condensers very materially, in the case of steam turbines, with most adverse reactions on the cost of electricity. Dependence on imported oil, however, rules out gas turbines for the time being. Our immediate concern is with the provision of a more reliable supply of electricity during the next few winters. That can be achieved, we believe, only through going straight ahead on the well tried lines of orthodox condensing steam practice.

STEEL AND POWER

Lord Citrine, in a statement presented at the last meeting of the National Joint Advisory Council, said that in the first half of this year 289 MW (sent out) of new generating plant was commissioned. This was considerably below what was estimated for the period. Construction work on certain stations had been stopped because of the lack of reinforcing steel; representations had been made to the Government and a steel allocation scheme was to be established. A similar situation exists in the United States. *The Times* reports that work on thirty projects will have to stop during the last quarter of the year for the same reason. There it is expected that the year's addition of new plant will be 17,000 MW, which will be from 2 to 4 MW below the objective. The disproportion between American and British plant additions (with due regard to the difference in population) will be noted.

APPLIANCE PRODUCTION

It is a sign of the bad times upon which the domestic side of electricity supply has fallen that stress is laid in the Ministry of Works report for 1950 upon the great increase in the production of gas appliances for houses. Although the output of electricity meters was in advance of gas-meter production three times as many gas cookers and over three times as many gas wash boilers were produced as their electrical equivalents. On the other hand, a slightly greater number of electric immersion heaters than gas water heaters was made. At a time when the electric fire is frowned upon it is somewhat surprising that the Ministry reports an increase of 30 per cent in the production of gas fires. Surely the gas industry has its peak periods too when the use of too many fires is likely to result in a very considerable reduction of pressure.

RURAL LINES

The electricity supply authorities fully realize their obligation to avoid disfiguring the countryside but they also have to remember their other, principal, duty to supply electricity as cheaply as possible to those who need it. Everybody with any æsthetic feeling sympathizes with the work of the Council for the Preservation of Rural England but rural dwellers are apt to consider, too, that their electrical needs must be satisfied even if it means the erection of overhead lines in pleasant places. This serious problem with which the B.E.A. and Electricity Boards are faced can generally be solved by using underground cables—but at whose expense? The C.P.R.E. believes that the cost should be borne by all electricity consumers, but we still think that it should be a national charge.

IMPORTING ELECTRICITY

Electrical connections with Norway and France have for some years been thought of by engineers as possibilities of a more or less remote future. Incidental references to them by Lord Citrine came as news to and were misinterpreted by some of the daily papers as relating to some immediate development. Unfortunately they will not abate the need for new generating plant here. Surplus power from Norway (if any) must await large-scale d.c. transmission, still very far ahead. Interlinking with France may be nearer. Apart from technical problems, awaiting solution entailed in transmission by submarine cable, growing demands in the North of France will have to be met largely from hydro-electric water power from the south probably at a pressure of 400 kV, as yet untried.

Clay Winning

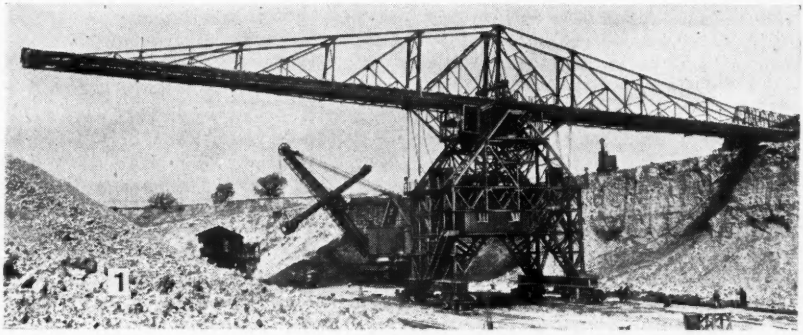
Operations in a Very Large Quarry

ONE of the most extensive and very heavy duty electrical quarrying installations we have seen is that at the Stewartby works of the London Brick Co., Ltd., which is among the largest in the world. Its maximum output capacity is nearly 12 million bricks per week. The raw material is Oxford clay, which is obtained on site from the bed which extends north-east to south-west across the country, roughly from a little north of the Wash to Dorset. Near Bedford, the works is thus near the centre of the bed and at a point where the clay is sufficiently thick and close to the surface to permit economic working. The pit from which the clay is excavated now has an "open" area of about 300 acres and operation as a whole, with the exception of steam locomotive haulage across the quarry floor, is almost entirely "electrical" throughout. Oddly enough, perhaps the greater electrical interest lies in the plant and method used for removing the overburden, mainly because of what is known as the 300ft conveyor.

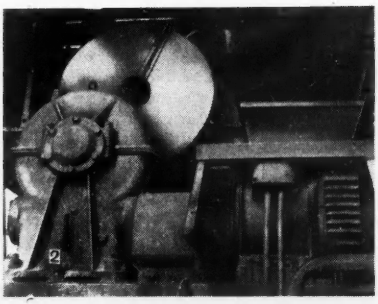
Two Ruston Bucyrus excavators initiate the overburden-removal operation. One of these is a drag-line equipment with a three-yard bucket, which stands at ground level and excavates and lifts directly at the upper surface. The other machine is a crane navvy with a 1·25 yard bucket, which stands on top of the clay bed about 20ft below ground level where the overburden has been removed and cleans up the overburden face. Both of these excavators are single-motor equipments. The 100 h.p. at 730 r.p.m., s.c., star-delta controlled motor of the drag-line machine transmits power through reduction gearing to a main shaft to which the hoist and drag-line drums are friction clutched. The clutching is assisted by compressed air which is supplied by a small "on board" motor driven compressor. The 50 h.p. motor of the crane navvy is associated with similar power transmission arrangements, but in this case compressed air is not used.* Both machines are supplied at 400 V by 4-core armoured rubber trailing cables from a 150 kVA transforming substation of transportable kiosk type which is fed at 6·6 kV from a substation back nearer the works and incorporated in the permanent distribution system.

Both of the overburden excavators deliver their bucket charges into the turn-table feeding hopper of a 100ft belt conveying machine which stands at the same level as the crane navvy on top of the clay bed. This machine has three separately powered major motions. The 3ft wide belt conveyor proper, with its run along a

Above: **The huge clay quarry now has an "open" area of about 300 acres**

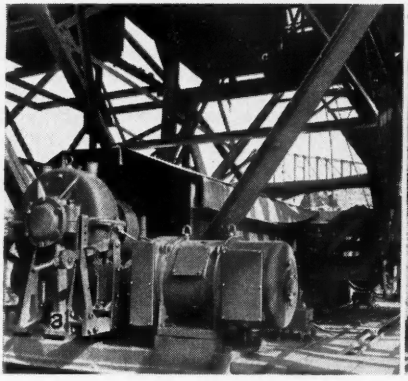


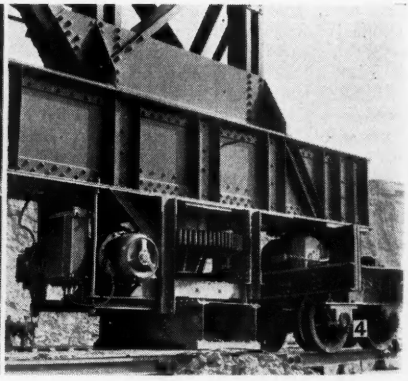
The greater electrical interest in the quarry lies in (1) the huge conveying equipment for the removal of the overburden; (2) conveyor belt driving arrangements; (3) jib tilting drive; (4) bogie and lifting jack; (5) Motor generator and switch room



swivelling cantilever jib of girder construction, is driven by a 15 h.p., 570 r.p.m. motor which transmits power through worm reducing gear to give the belt a speed of about 100ft/min; it also drives the turntable feeding hopper. A 10 h.p. motor serves both the slewing and travelling motions, with pinion and spur reducing transmission in each case, while a small winch driven by another 10 h.p. motor handles sleepers so that the machine can lay its own track when travelling. These three s.r. motors have drum type controllers.

In turn, the 100ft conveying equipment discharges its load on to the huge 300ft conveying equipment already mentioned. This unusual plant was designed by the London Brick Co.'s own engineering staff and its object is finally to dispose of the overburden with the minimum of handling by tipping it back. The machine stands at the bottom of the pit and extends upward



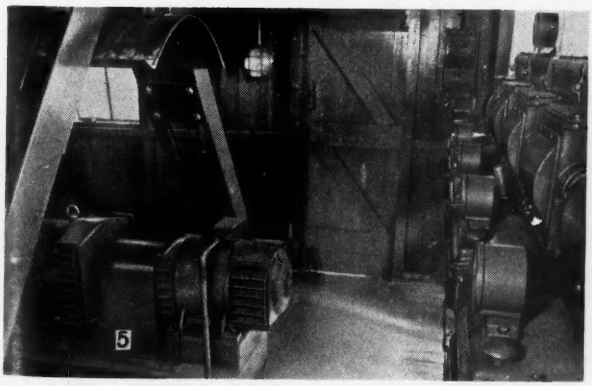


t a height of about 6 ft, almost to the top level of the clay bed. At the top is a 300ft long double cantilever type of girder construction that carries the 4ft wide conveyor belt which receives the material from a hopper feeder at one end. The material first falls off the belt at the other end into the portion of the pit which has been worked out.

The clay is entirely removed from the face by an electric navvy with a six-yard bucket which discharges into a sorting machine

The conveyor belt is driven by a 25 h.p., 725 r.p.m., s.r. motor which transmits power first through a David Brown enclosed reducing gear and then through a pinion train to the actual belt driving drum. This driving system is at about midway along the conveyor where the vertical structure supports the jib; also incorporated at this point are jockey pulleys for belt adjustment. The belt speed is about 100 ft/min and the conveyor will handle something like 300 tons of material an hour. Electrical interlocking between the circuit breakers controlling the motors driving the respective conveying machines ensures that the 100ft conveyor cannot be started until the larger conveyor is running. The jib of the latter conveyor can be tilted through an angle of 12·5 deg from the horizontal. This is effected by horizontal to and fro movement of the bottom of the V-extension from the jib immediately under the cantilever pivot point. The horizontal movement is brought about by the engagement of a nut fixed to the bottom tip of the V-extension with a worm on a horizontal shaft which is driven through reducing gear by a 25 h.p. reversing motor.

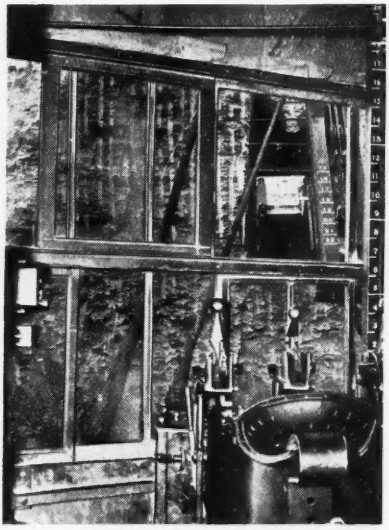
The rectangular vertical structure, and thus the whole plant, is carried by four bogies, one at each corner of the base of the structure. The two bogies on each side of the structure stand on a double line rail track, so that the whole plant is borne on two double line tracks. For propelling the plant along the tracks each bogie is driven by a 9·2 h.p., 206 r.p.m. (maximum) 100 V d.c. motor coupled by pinion and spur gear to the bogie wheels. All four of these propelling motors are energized under Ward-Leonard control from a motor generator set in a switchgear and machine cabin built into the vertical structure below the conveyor level.



When it is required to move the plant nearer to the face for a fresh cut the bogies are lifted off the tracks, turned through 90 deg and replanted on new tracks suitably aligned. The lifting and lowering are effected by four motor-driven jacks, one at each corner of the vertical structure base beside the respective bogie. Each jack has a 15 h.p., 730 r.p.m., 400 V, s.c. motor

coupled first through enclosed reducing gear and then through worm gear to the lifting screw.

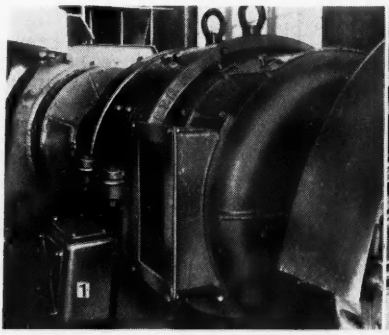
After removal of the overburden the clay is taken from the face by a Ruston Bucyrus electric navvy which we saw operating with a six-yard bucket, but the machine has a proved working capacity of up to ten yards. The bucket is worked vertically up the whole of the face while for lifting falls of clay at the pit bottom and generally cleaning up the worked face there is a much smaller navvy which acts as a feeder to the large one.

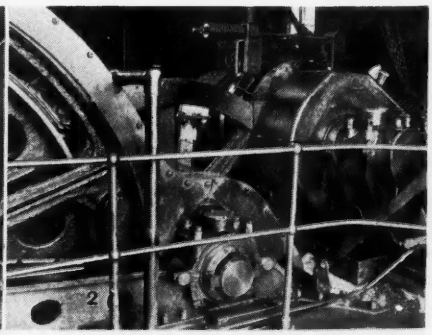


The navvy bucket is worked vertically up the whole of the face; bucket seen through control "cabin" window

To mention only the larger drives, there are in the big navvy two 150 h.p. hoist and travelling motors and a 200 h.p. slewing motor, all Ward-Leonard controlled. These motors, the multiple-generator m.g. set, switch and control gear, together with the power transmission equipment and the hoist winding drums are all installed within the very limited area of the machine room which has a floor space about 46ft by 28ft. At floor level across the back of the room is the m.g. set, driven by a 350 kVA, 400 V, auto-synchronous motor at 1,000 r.p.m. with a leading p.f. of 0·86. It is controlled by a "Korndorffer" auto-transformer starter which, together with the associated switchgear, is housed in an elevated sheet-steel cubicle between the m.g. set and the hoisting motors. Aligned on the one shaft with the driving motor are the 280 kW hoisting, 150 kW slewing and 60 kW racking generators, all 250 V, as well as the 12 kW 110 V exciter.

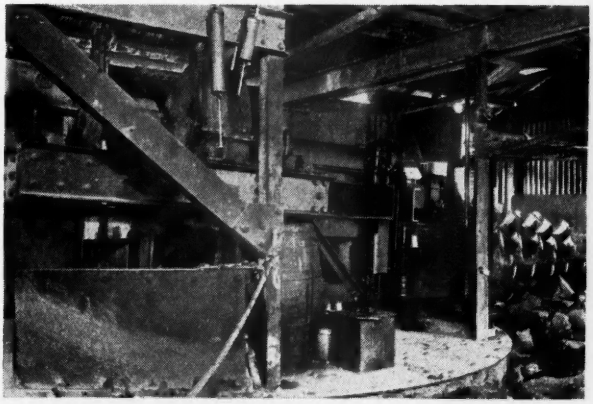
The two 150 h.p., 575 r.p.m. hoisting and travelling motors run in tandem and transmit power to the winding drum shaft through triple reduction gear. Normally the gear and drum shafts are clutched for hoisting and lowering, but for travelling the two shafts are declutched. All brakes on this machine are spring applied and released by compressed air admitted to air cylinders by means of solenoid operated air valves. The 200 h.p., 620 r.p.m. slewing motor is coupled through spur and bevel





The motors, the m.g. set, the transmission gearing and the winding drums are installed in the very limited space of the machine room of the navvy: (1) M.g. set; (2) hoist drive; (3) slewing and torque motors; (4) m.g. motor starting equipment

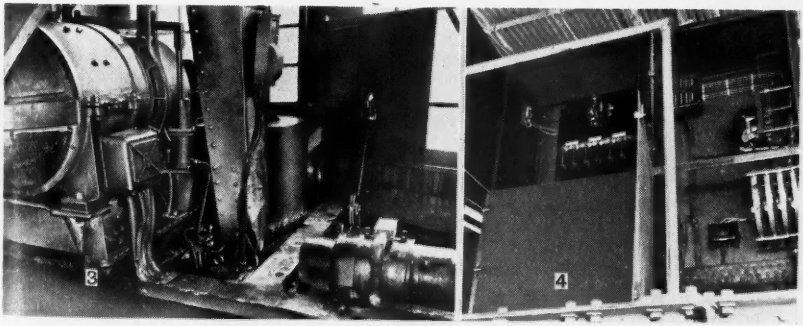
reduction gearing to a vertical shaft at the bottom of which is a pinion engaging with the rack round the turntable undercarriage of the machine body. The racking motor is about halfway up the jib near the pivotal point, or base, of the racking arms. Its 130 h.p. at 590 r.p.m. is transmitted through spur gearing to two pinions which engage with racks along the underside of the arms. To work the bucket door a s.r. motor is used with a permanent resistance connected in its rotor circuit, adjusted to give just sufficient torque to keep the tripping rope taut. When this resistance is short circuited by push-button operated contactor the motor torque increases sufficiently to withdraw the bucket catch. The hoisting, slewing and racking motors have their fields constantly excited and the driver, in his corner with its large observation windows, has at hand the drum controllers for the respective generator fields. Electricity is conveyed to the revolving superstructure from the undercarriage by horizontal sliprings and collector gear.

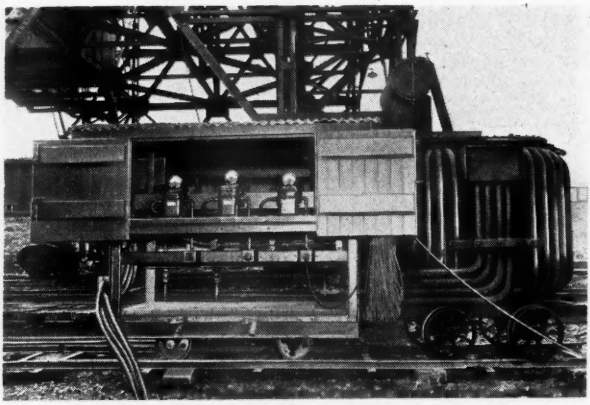


The sorting machine kibbler tool (right) extends from a frame which is pivoted at the far (motor) end

The clay is discharged from the excavator bucket into the external delivery hopper of a sorting machine in which the material is broken up and rock or other foreign matter is removed from the clay. These operations—kibbling and sorting—are effected while the clay is carried round on a turntable which is fed from the hopper and revolves about a circular stationary platform in the horizontal plane. The turntable is operated by two 20 h.p., 725 r.p.m., s.r. push-button contactor controlled reversing motors mounted horizontally below the table level at two corners of the machine structure. In each case there is horizontal to vertical transmission in an enclosed gear box from which an upward extending vertical shaft has a top pinion which engages with a rack round the periphery of the table.

Higher up, in the machine enclosure where the kibbling takes place, above but bearing horizontally on the travelling clay, is the kibbling tool. It is a heavy somewhat tapered shaft with staggered projecting





The pit bottom machinery electrical equipment is supplied from a transportable substation

teeth which revolve in the vertical plane, thus cutting into the clay on the table. The tool extends from the kibbler frame which is mounted on the stationary central platform and is pivoted at the far end so that the kibbler can rise and fall when rock is encountered.

In such instances the turntable can be reversed, thus backing the clay up against the kibbler knives which turn the clay over, bringing the rock to the surface where it is removed by the hand sorter. The driving motor is mounted on the far end of the kibbler frame near the pivot point. It is of 40 h.p. at 730 r.p.m., s.r., with drum type rotor control, coupled to spur gear which reduces the speed to a few r.p.m. The broken clay automatically falls from the turntable into a hopper which fills trucks drawn by a steam locomotive on a rail track extending under the sorting machine. The feeding hopper doors are operated by compressed air.

The sorting machine, a massive complicated structure of girders, is mounted on four bogies, one at each corner. For travelling the two front bogies are powered by a 20 h.p., 725 r.p.m., s.r. motor with drum rotor control. Power transmission is by cross-shaft, vertical shaft and bevel gears to each bogie.

The pit bottom machinery just described is supplied electrically at 400 V from a transportable 350 kVA substation consisting of a switchgear chamber and a transformer carriage coupled up mechanically on wheels on a rail track. This substation intake is at 6·6 kV from a permanent substation, at first up to a point 200 yards from the transportable substation by p.i.l.c. armoured cable laid on the ground surface and then by four-core armoured rubber trailer cable. On the low voltage side there are three single-core 0·5 sq in cables from the transformer to the navvy and one 0·5 sq in cable for earthing. The transformer is fitted with special disconnecting arrangements to facilitate the testing of the trailing cables in accordance with the Quarries (General) Regulations (Electricity), 1938. The steam locomotives haul the trains across the pit bottom to a loading station where the trucks are transferred to a chain haulage system for conveyance to the brickworks proper.

In an extension to the main pit the overburden is removed by a diesel navvy and passed on to a 100ft slewing conveyor identical with the machine of the same dimensions in the main pit. In this case there is no larger conveying machine and the 100ft equipment dumps the material directly into a worked out part of the pit extension. From the pit extension the clay is claimed by a Ransome & Rapier walking dragline equipped with a 6 cu yard bucket. The excavator stands on top of the clay bed. It has a 125 h.p. hoisting and a 57·5 h.p. slewing motor, both supplied from a Ward-Leonard m.g. set with a 120 kW, 230 V hoisting generator and two overhung slewing generators which operate in parallel with a total capacity of 62 kW at 250 V. This two-bearing m.g. set is driven by a 200 h.p., 1,460 r.p.m., 3·3 kV directly started s.c. motor.

One motor serves both the hoist and drag-winding drums through friction clutches which are operated by compressed air. It also drives the walking equipment, for which purpose the motor is declutched from the hoist and drag-line drums and clutched

the walking equipment shaft. Large centrics, one on each side of the machine, e carried by this shaft and, in turn, the et are carried by the eccentric. Thus in a quence of operations the feet are lowered d take the main weight of the excavator. uring suspension the body is moved ackward a stride in advance of the feet, hich are then raised again and the body once more supported by its central tub ase; finally the feet are moved forward a ride in advance of the body. The ewing motor transmits power through nclosed reducing gear to a vertical shaft t the bottom of which is a pinion which ngages with a rack round the tub base. lso on this drag-line machine are a separately driven exciter for the Ward-Leonard m.g. set and a motor-driven compressor for the clutching operations.

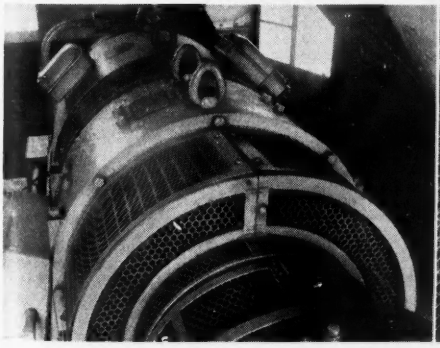
The drag-line bucket is discharged into a feeding hopper mounted on a travelling base which is equipped with a 35 h.p. motor-driven compressor supplying air for operating the hopper feeding doors, and a 12·5 h.p. travelling motor. In train formation the trucks filled from this hopper are hauled by diesel locomotives to another loading station where they also are transferred to the chain haulage system.

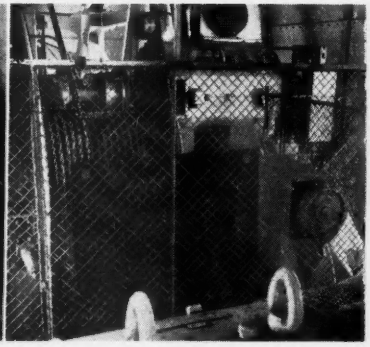
With the exception of the 3·3 kV supply to the drag-line excavator, which is taken directly from a permanent substation by p.i. and trailer cables, the distribution for the pit extension machinery is arranged on similar lines to that in the main pit by means of a transportable substation. All the pit machinery motors so far referred to are of B.T.H. manufacture.

Considerable quantities of surface water which collects in the pit have to be removed by a pumping station equipped with three 60 h.p. E.E. motor-driven Holden & Brooke single stage centrifugal pumps. For general compressed air supply in the pit there is a 66 h.p. motor driven Ingersoll Rand 2-stage 250 lb/sq in compressor.

We are indebted to the London Brick Co., Ltd., for permission to visit the works and to publish this article.

In the pit extension a walking drag-line excavator (right) removes the clay and delivers it to a truck feeder hopper. *Below.* **M.g. set and hoist motor and (right) winding drum**





VIEWS on the NEWS

By REFLECTOR

THERE seems to be trouble here and there in the assessment of houses in connection with the new standard tariffs. Briefly it revolves round the question: " What is a room? " Sometimes, it seems, sculleries, boxrooms and similar parts of a house are regarded as rooms and sometimes ignored. The writer of a letter to the *Nottingham Evening News* says he has installed a gas cooker in what was formerly a coal house, measuring 6ft by 3ft. This is said to be a room by " the electric light people." It is hard luck that the installation of a gas cooker should raise the price of electricity especially when there seems to be hardly room enough to allow the oven door to be opened.

* * *

Recently Mr. N. Ashton, manager of the Halifax District of the Yorkshire Electricity Board, addressed the Halifax Chamber of Commerce on the subject of load spreading. At the meeting Mr. C. H. Vaughan (Alfred Graham & Co., Ltd.) is reported by the *Yorkshire Post* to have said that domestic electricity consumption should be curbed. One way of doing this would be to install a fuse which would blow when a fixed maximum load was exceeded. This would be replaced by the supply authority free on the first occasion but subsequently a charge of 5s or 10s should be made. I am glad to see that Mr. Ashton said emphatically that this was impracticable. Mr. Vaughan (like many others with similar schemes) has taken no account of the time of the maximum load which is what matters. A consumer should not be penalized for using electricity out of peak hours.

* * *

An electricity failure with rather strange consequences occurred at Mansfield recently. It affected only the d.c. supply, with the result that whereas at the Congregational Church both the organ and the lighting failed, at St. Peter's Church the organ continued but there were no lights (presumably the organist was an expert). On the other hand, states the local Press, at the Unitarian Church the lamps remained lit but the organ stopped. Similar rather odd effects occurred at the cinemas, but happily the failure was only of short duration—nine minutes.

* * *

Every so often the question arises: " Which was the first electrically lighted town in the British Isles? " It has cropped up again in Electricity Board circles. The Southern Board's magazine recently claimed the honour for Godalming which is in its area. This is conceded in the latest issue of the East Midlands Board's journal but only to the extent that Godalming may have had a few electric lamps by November, 1881. It goes on to say, however, that Chesterfield (in the East Midlands Area) was really the first town to go over exclusively to electricity for street lighting and it reproduces a passage from *The Graphic* dated 13th May, 1882, in support of its statement. This mentions that nine miles of the town's streets were then lit by 22 Brush arc lamps and a hundred Lane-Fox incandescent lamps. The necessary power was generated in a central station housing two " Brush 40-lighters, each able to supply 40 arc lights of 2,000 candle power or one circuit of 320 incandescent lights of 15 candle power."

* * *

Among the arguments in favour of district heating in conjunction with power generation put forward by Mr. Oliver Lyle in *The Times* is the following:—

> " Gas energy is sold at four times the cost of coal energy; electric energy at 14 times coal energy. Gas is poisonous and explosive; electricity electrocutes you and sets your house on fire. The only hazard of district hot water is a possible scald."

Mr. Lyle forgets to mention that water drowns you and that hot water is proverbially something to keep out of.

British Association

Further Papers and Discussions

LAST week we summarized Mr. T. Lawrie's paper on the work of the North of Scotland Hydro-Electric Board. Opening the discussion the chairman (Sir Claude Gibb) said that the point which struck him in Mr. Lawrie's paper was the conclusion that it was not generally realized that one thing contributing in major degree to load shedding of electricity in Great Britain was the rationing of coal and coke.

Mr. T. G. N. Haldane said he had been most interested in the scale of developments in Scotland compared with what was required. If only the last column of Mr. Lawrie's table had been correctly headed, they would all be happy.

With regard to kWh the scale was not very hopeful because, if he was right in thinking that the country was going to be at least 10,000,000 tons of coal short in the comparatively near future, that would mean about 20,000 million kWh. Mr. Lawrie's maximum conceivable development in the next ten years was probably optimistic and it would only go half-way towards meeting the probable shortage of coal.

The alternative to not proceeding with further hydro-electric development in Scotland might very well be the importation of coal at very much higher prices than the present pit-head prices.

Wind-Power Economics

The economics of wind-power would improve rapidly with the size of windmill. The very small windmills were very cheap in comparison with their kW capacity, then the price rose to the 100 kW mark and fell steadily right down to much lower figures for generators of 2,000 to 4,000 kW capacity.

In reply to questions by Mr. Howarth, Mr. Lawrie said tariffs for power on the whole were not dissimilar to those in other parts of the country. The domestic tariff was a three-step one with a possible fourth step and it was based on the number of rooms.

The farther north they went the higher the load factor became, because if they were going to export power the more important transmission became as a part of their cost. Even greater than the problem of exporting, however, was that of meeting the load in their own area, because the steam plant in Aberdeen and Dundee was getting overloaded and the demand throughout the whole of the ports area was certainly behaving in the same way as it was in the rest of the country. With regard to wind-power he agreed that it was wise to hasten slowly.

Mr. Feiner said terrific problems were involved in rural electrification in Scotland. In that respect it might not be out of place to mention that, surprisingly, the highest electrification in the world appeared to be in Japan, where it was run on similar lines of hydro-electrification with high density rural electrification.

Scotland's Resources

Five sections combined in the discussion of the natural resources of Scotland—geology, geography, agriculture, forestry and economics—and population problems in relation to those natural resources.

The chairman, Prof. L. G. Ogilvie (Edinburgh University) said it was the geographers' function to study integration, the question being whether foreseeable economic conditions justified the fullest development of resources.

Mr. A. A. Fulton (chief hydraulic and civil engineer to the North of Scotland Hydro-Electric Board) reviewed the more important of the water power projects. The terrain of Highland Scotland, its large rainfall, small evaporation and other losses favoured relative uniformity of run-off distribution over the year with a measure of advantage for the winter months, although lack of suitable sites for large capacity reservoirs restricted the possibility of making up deficiencies between one year and the next.

Development had been spasmodic. Of an estimated 10,000 million kWh annual

potential output, about 1,500 million kWh was being generated each year before passage of the Hydro-Electric Development (Scotland) Act, 1943. Since then schemes for almost 2,000 million kWh yearly output had been undertaken. Additional projects for 1,000 million kWh yearly output were, or were on the point of, being promoted.

When Section L—Education—discussed Higher Technological Education Sir Arthur Fleming (Metropolitan-Vickers Co.) presided.

The position from the point of view of the technical college was put by Mr. H. J. Cull (Birmingham College of Technology), who spoke of the close association between the colleges and industry, the growing recognition of the need for increasing numbers of technologists and the recruitment field. Then he dwelt on the shortage of staff and accommodation in the technical colleges, future developments, research and special advanced study facilities.

The University aspect was discussed by Prof. J. C. Prescott (King's College, Newcastle-on-Tyne), who said that in discussing higher technological courses two schools of thought might be distinguished. One of them regarded such courses as providing an opportunity to treat of specific advances in technology; the other advocated advanced courses in which the emphasis was upon fundamentals and in which recent technological developments appeared as illustrations of the more general theory. There was a fundamental difference which should be defined at the outset, for the definition would show which type of course was appropriate to the universities and which was not.

Wider Technological Scope

There was a need for higher technological instruction in the universities because of the rapid advance in technical achievement and the reorganization which had taken effect in the courses of many of the universities, under which (great insistence being placed on the study of the fundamental sciences) less time was available for the study of their applications in technology. It had become apparent that a three or four years' course allowed insufficient time to treat of all the advances in one branch only of (say) engineering and it was clear that future advances would only make the situation more difficult. The universities, therefore, had set themselves to arrange courses which should first establish the fundamental principles upon which technology was erected and then show their application by examples selected from among modern developments. They widened an horizon which was rapidly becoming over-burdened by excessive detail and they approached the particular by way of the more general.

Prof. Prescott did not believe that universities could usefully conduct courses the content of which was little more than a description in isolation of recent developments in technology. A university might act as an administrative centre for the arranging of such courses, but it could not with honesty pretend to conduct them; they were foreign to its temperament and beyond the scope of its staff.

Shortage of Personnel

Sir Arthur Fleming, in his contribution to the discussion, said industry was interested in three groups: designing, pure science and applied research. There was a shortage of personnel in industry. It was necessary to take in young people and 50 per cent had come up the hard way. In the end the things that mattered as much as degrees and diplomas were personal qualities and those seemed to come through the boys who had come up through industry and who had been released to take part-time courses. Higher up the ladder it was those qualities of leadership and of the good social mixer, rather than high technological ability, that told. No barriers should be erected against their being allowed to take research degrees.

Heat transfer was the subject of two papers in Section G—Engineering—one of them on contra-flow apparatus and the other on steam condensation. In the former Mr. C. E. Iliffe (C. A. Parsons & Co.) first concerned himself with the optimum balance between heat transfer and pressure loss in shell-and-tube exchangers, with special reference to the industrial gas turbine. He then turned to the more complicated regenerative exchanger and prediction of its performance. A final section of the paper was devoted to recently developed methods of estimating the proportions of cooling towers.

Two modes of steam condensation were dealt with by Mr. H. Hampson (Queen Mary College, London), who explained that

when a pure vapour condensed on a clean cooled surface, which it readily wetted, the continuous film that was formed retarded transfer of heat and limited its flow to the cooling medium on the other side of the surface.

When the latter was not wettable by the liquid being condensed, a distinctly different form of dropwise condensation occurred. Initiation of this process was still obscure, but its growth was mostly by coalescence and gravity slide. Repetition was very rapid, most of the heat transfer taking place across the spaces which appeared to be free between the minute droplets.

When steam was the condensing vapour the surface heat-transfer coefficients for the filmwise and mixed modes were usually less than one-tenth that for purely dropwise condensation. Surfaces that favoured the dropwise mode and the processes taking place on them had always tantalized research workers. Nevertheless the considerably smaller surface area that sufficed for a given duty, particularly when high heat flow rates were required, justified exploration of the subject. The paper included some of the results of a large number of tests made at Queen Mary College.

In the discussion Mr. J. M. C. Dunlop asked whether it was possible to verify by measurement the performance of the heat exchangers discussed and Mr. Iliffe replied that the checking of the calculations he had given was at the moment under way.

Cooling Studies

Mr. C. W. Marshall, while admitting that the cooling tower was not altogether a popular feature of the landscape and commenting on the large area it covered in many cases, pointed out that it had rendered very great service to this country by making it possible to provide reasonably efficient generating stations near the load. The Hams Hall cooling tower installation was one of the most efficient in Britain. The specific volume per unit of heat in cooling towers was very variable and little fundamental study of the thermodynamics of the cooling tower had been made. The complaints of the public living near generating stations had been disposed of fairly rapidly and comparatively inexpensively. Further, in the course of the examination of the problem a theory of cooling had been evolved which had enabled tests to be made under any weather conditions.

It was hoped to publish a paper in the near future which would at least partially remove the existing ignorance about cooling towers.

Forced Draught Tower

Mr. Iliffe agreed with Mr. Marshall about the value of the film type as against the drop type, but pointed out that drop surface was cheap and that film surface was expensive. They were still a long way from having complete data on the splash bar as compared with the film type. He felt that they should give far more consideration to the use of the forced draught tower, which would be smaller.

Mr. S. Weinberg pointed out that, while in conventional heat transfer apparatus the speeds were relatively slow, in the engines used in rockets, etc., gas speeds could reach 5,000 ft/sec, colossal quantities of heat being transferred across a comparatively small area and of correspondingly small bulk. He invited the author to discuss the possibilities of using enormous speeds and correlating the dimensionless data to produce heat transfer coefficients sufficiently large to reduce the losses that were experienced in the conventional types.

Mr. Iliffe said the method he had outlined was to find precisely what was the best speed to give the most economically suitable heat exchanger. There was wide scope for research in connection with fouling.

Mr. W. W. Campbell commented on the considerable arithmetical work involved in the economic proportioning of heat exchange surfaces. He mentioned an alternative approach, consisting of partial differentiation of an expression for the total cost of the whole surface in all its implications. That approach, in the case of steam condensers, was dealt with very fully in Bottomley's classical paper in 1942 and there was no real reason why the same approach should not apply to other forms of heat exchange surface.

The extremely complex cooling tower issue, especially in the case of the natural draught, involved to a very large extent a meteorological problem. Some of the meteorological analytical methods had not been used so far, for data was lacking. However, the data which was accumulating

now might provide further information on the design of natural draught towers. In some cases where mechanical draught towers were considered it had been found necessary to increase their height considerably to avoid re-circulating the contaminated air coming out at the top.

Mr. Iliffe agreed that the method of optimum recuperator design as he had described it had the disadvantage which Mr. Campbell had mentioned.

Although he had known of the alternative partial differentiation method, he had never seriously considered adopting it.

Such experience as he had had of forced draught cooling towers indicated that re-circulation could largely be avoided by the use of induced draught rather than forced draught.

Use of a "Promoter"

Mr. S. Weinberg commented that the general object of studying heat transfer during condensation was a negative one. In design they wanted to know how much of the metal surface was free of condensation, for then they could assess roughly the total heat transfer. To that end it would be better to have big hemispherical drops rather than small ones and it seemed that the use of a "promoter" which reduced the local surface tension would tend to defeat one's object by producing small rather than big drops. Therefore, he asked why the promoters which had been used so far all tended to reduce the surface tension of the water.

Mr. Hampson said the principal was probably coalescence. His impression was that the process was unstable and that minute droplets were formed so fast that they could exist only for a fraction of a second. However, quite an amount of heat went through the minute drops. They did not necessarily want big drops, but tiny drops.

Mr. J. R. Appleton felt that boilers would suffer if one began injecting "promoters" into the steam, and there would be dropwise evaporation on boiler tubes, which he did not think was desirable; apart from any chemical reactions which might take place, he believed that troubles would arise.

Mr. Hampson did not think the small quantities he had been using would cause much trouble.

In one of the papers contributed to Section G—Engineering—Mr. T. G. N. Haldane (partner, Messrs. Merz & McLellan) spoke of the steadily increasing scale of power system interconnection with rising transmission voltages, which trend had reached international proportions. It was now tending to become political rather than technical, particularly in Western Europe.

A parallel development was the search for sources of power other than coal. Apart from the economic incentive there was growing consciousness of the obligation to explore, for the benefit of future generations, the non-expendable sources of energy before expendable resources had been used up. The most important, for the world at large, of the several ways of lessening dependence on coal was to make more use of water power. To do that would necessitate transmitting large blocks of power over great distances; nearly 1,000 miles would appear to be the goal of present endeavour.

Mr. Haldane here remarked that the urgency of the problem to which he was referring was perhaps not sufficiently appreciated.

The National Coal Board had estimated the total demand for British coal at 240 million tons a year in the 1961–65 period. The amount included in that estimate for electricity generation would very probably fall short of actual requirements by 10 million tons a year, or more; that extra quantity might not be available when it was needed.

Transmission at 400 kV

Power transmission requirements likely to occur in Europe during the next twenty years could be satisfied by the use of a.c. at not more than 400 kV, for which twin conductors would suffice, at least where the system neutral was solidly earthed. Objections to substantially higher voltage were the very great cost of transformers and switchgear at line terminations and, what was sometimes overlooked, the very large substation space needed.

The additional complication and expense of means of improving stability, such as single phase switching and auto-reclosing after transient faults, were fully justified for very high voltage lines. Both air-blast and oil-tank switches would be used in the super-grid in England; 275 to 132 kV interconnections (also 380 to 220 kV in Sweden) would be by auto-transformers because their cost, losses and impedance

would be lower than those of double-wound transformers. Their use involved direct earthing, which was British grid practice but not general in Europe. It was hoped that the first portions of the 275–300 kV super-grid would be operating by 1955. It would be combined with circuits, which might be designed for future operation at 380 kV, provided for the direct transmission of electricity generated in cheap coal areas to densely populated districts, since it was no longer cheaper to transport coal 150 miles by railway.

Cross-Channel Interconnection

There had been contact between the British Electricity Authority and Electricité de France regarding the commercial feasibility of cross-Channel d.c. interconnection by undersea cable. Study had been initiated, but the matter was extremely complicated and involved many different factors.

The economics of transmission might easily be over-simplified to the point of being quite misleading. This danger was particularly liable to happen if the performance of the transmission system was considered apart from the generation system. In the case of hydro-electric projects it was especially necessary to study generation and transmission costs as a whole. The paper concluded with results of a preliminary study of this kind, indicating graphically the least total cost for a variety of loads and load factors.

Water Power Resources

Sir Harold Hartley said he had a very strong feeling about the importance of the transmission of large blocks of power because, looking at the world picture, the future depended more on supplies of energy than on any other single factor. The potential water power in the world was roughly, at the present valuation, equivalent to the total energy consumption of the world to-day, but only a small proportion of it was actually being tapped. The rising cost of fuel and the fact that it was a limited capital resource gave an immense importance to the full utilization of hydro-electric power in the future. Although in this country the prospect of needing d.c. transmission might be a very small one, its probable importance in the world as a whole and to the future of our export market made it a problem which merited the very fullest discussion and development so that we might be able to evaluate as closely as possible what were going to be the economics of the future.

The chairman said he could foresee a very glum future, at least for the next ten years, and unquestionably every possible alternative source of power should be brought in, which would inevitably involve the use of long-distance extra-high-voltage transmission.

Prof. R. O. Kapp said attention might be drawn to a point that was implicit, namely, the limitations of long-distance transmission. The borderline at 50 c/s was 930 miles and then there was another set of difficulties, so they must not delude themselves into believing that greater distances could be overcome merely by increasing the voltage, or by any changes in the line construction. The two factors which imposed limits at long distances were the rise of voltage on switching off and the phase displacement between the ends of the lines. If, in addition to increasing the voltage, one wanted to increase distance (above, say, 400 or 500 miles) there was nothing for it but "frills" like shunt reactors and series capacitors.

D.C. for Long Distances

Mr. F. C. Winfield remarked that water "plums" had been worked out so power was getting farther away and it was a known fact that it must be dealt with in larger blocks in order to keep the economics right. The cost of transmission was the major issue in any development and the voltage had been pushed up over the past sixty years until they saw themselves beginning to get caught in the toils. As lines stretched farther, the cost per mile not only went up but the capacity was coming down. The compensation was mostly an expedient to try to keep the line capacity up and he could not see any particular way in which costs could be held down. They were left to consider d.c. which for long distances offered an inherently cheaper line without many of the disadvantages of a.c., but was it a fact that it could be done? He did not think anybody could answer positively. It required a large and costly development.

They could try on a small scale, but their minds were too small to be sure of themselves until they had tried on a large

scale. Therefore the world demanded that they should prove or disprove the case for d.c., but it would require a lot of money.

Investigations Costly

He could see many possibilities in the underground cable, such as crossing the Channel, and in the last few weeks he had heard of an inquiry from Canada in that connection. In Eastern Canada they had no easily obtainable coal and it was impossible to import owing to the cost, and so they were looking to the Hudson Bay coal, very many miles away. Recently the Canadians had pointed out that they could shorten those miles quite considerably by cutting across the Bay, and they had asked: " Can you give us a d.c. scheme?" Similar examples could be found in many parts of the world. Also, because the estuary stations in the Thames were becoming saturated, economics were forcing them to consider using Midland coal for London by shipping something like 1,000,000 kW over the wires. That would be all right until 1960, but in 1970 they would need 5,000,000 kW and there was a considerable objection to overhead lines by many people. The answer was cable—d.c. or a.c.—so there was undoubtedly a clear case for investigation but they needed money with which to do it.

Mr. T. Lawrie felt that one of the obvious ways of saving coal was to electrify more and more. If they managed to double the output of electricity and, at the same time, to increase the thermal efficiency of power stations to 25 per cent they would get double the amount of power for very much less than double the amount of coal.

Dr. A. P. Thurston asked if it was not a fact that the figures in the paper were for taking all the power all the way whereas it was possible for lines to go to various centres of population and shed some of the power at those centres, so reaching a greater limit of distribution. Speaking as a flying man he would like to see the lines kept in the valleys so that pilots did not run into them when going over the tops of the hills.

Mr. A. Feiner expressed the view that they should consider very seriously the growing probability that, instead of having to take the power to the people, they would have to take the people to the power. One of the difficulties facing the water turbo-generator designer was the production of stable line charging currents as a limiting factor. He had been associated with a.c. convertors for some time and he would like to know whether the difficulty in inverting had been overcome.

Mr. C. Cherry said that one thing Mr. Haldane had not mentioned was the possible influence that research into high dielectric constant and high dielectric strength might have on transmission in the future.

Mr. Haldane, in reply, said he entirely agreed with Sir Harold Hartley. The canalizing of research would help very much: if one started off with a vague idea of what one wanted to achieve things might go rather slowly. That was why he wanted to canalize it all for the moment into the definite idea of interconnection with the Continent. He was convinced that we were just on the verge of a really acute problem of coal shortage which would be far worse than the present problem of generating capacity shortage. The 275 kV grid would enable generation to be concentrated in the highly economic stations and in that way surprisingly large quantities of coal would be saved. He could not quite agree with Mr. Lawrie's view that greater electrification would solve the coal shortage problem, by which he probably meant that greater electrification would result in substantial additions in the sense of higher thermal efficiencies. His own view was that the consumption of coal for generation purposes was going to be far higher than was generally thought, certainly higher than the Coal Board thought, and there would be a shortage of coal.

L.C.C. Educational Guide

THE annual guide (" Floodlight ") to further education in London, published by the London County Council, is now available. This contains particulars of fees for the various courses, an alphabetical list of subjects taught in evening classes, information regarding day-time vocational courses, and the addresses of the 200 colleges and institutes where students may enrol.

Enrolment week for the session begins on 17th September, and the classes commence on 24th September. The guide (9d, or 1s by post) can be obtained from booksellers and newsagents, or at the London County Council's Information Bureau, County Hall (Room 8, South Block), Westminster Bridge, London, S.E.1.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE British Electricity Authority has appointed **Mr. W. G. S. Bond**, A.S.A.A., an assistant chief accountant of the staff, as deputy chief accountant to the Authority. He succeeds **Mr. F. H. Grigsby**, O.B.E., F.S.S., who has retired on reaching superannuation age. Mr. Bond was with Annan Dexter & Co., Ltd., chartered accountants, London, and in 1941 he joined Edmundsons Electricity Corporation, Ltd. Upon the establishment of the British Electricity Authority in 1948 he was appointed chief assistant to Mr. A. M. Scott who was then a deputy chief accountant.

Mr. Grigsby was appointed to the staff of the Central Electricity Board on its establishment in 1927 and for twenty-one years was in charge of the internal accounts, cash and capital branch. He became deputy chief accountant to the British Electricity Authority in February, 1948.

Mr. J. F. Elphick, A.M.I.E.E., M.Amer. I.E.E., until recently power adviser, Land Nordrhein-Westfalen, under the Foreign Office (German Section), has been appointed overseas liaison engineer on the staff of the British Electricity Authority. Mr. Elphick was educated at Bexhill College and Eastbourne Technical Institute, and received his practical training with the Bexhill Corporation Electricity Department.

Mr. J. F. Elphick

Before joining the Power Division of the Control Commission in September, 1945, he had fifteen years' experience in England on operation, testing, repair and maintenance of generating plant and equipment, and nine years on transmission and distribution. A large part of this time was spent with the City of Winchester Electricity Department. During the 1914-18 war he served in the Royal Naval Air Service and Royal Air Force.

Capt. B. H. Peter, C.B.E., A.M.I.E.E., has been appointed by the president of the Transport Tribunal as one of the three gentlemen who will hear appeals formerly heard by the Road and Rail Tribunal, the jurisdiction of which was transferred to the Transport Tribunal last week. Capt. Peter had been a member of the Road and Rail Appeal Tribunal since April, 1949.

Mr. W. H. Swain, a director of Hirst, Ibbetson & Taylor, Ltd., Manchester, has been elected vice-president of the Electrical Wholesalers' Federation for 1951, to fill the vacancy caused by the election of **Mr. G. W. Cartwright** to the presidency. Mr. Swain was president of the Federation in 1945 and has served on the Council continuously for the past fourteen years. He is, in addition, a representative of the Federation on the Electrical Fair Trading Council.

Mr. W. H. Swain

Mr. T. Lawson Noble, industrial consultant, 13a, Sheffield Terrace, London, W.8, informs us that he is shortly going to Karachi, where he will act as resident agent for Pakistan and India for a number of British electrical concerns.

Mr. L. Preston, who has for the past three years been electrical engineer for the Parks Department of Doncaster Town Council, has left to take up a new post at Salford. During his stay at Doncaster, Mr. Preston has been responsible for the illuminations in Hexthorpe Dell. This year's illuminations, which will last until 16th September, were switched on by the Mayor of Doncaster (Ald. Mrs. Rose Hodson) on 13th August.

Viscount Falmouth, M.I.Mech.E., Companion I.E.E., has been re-elected president of the British Internal Combustion Engine Research Association for 1951-52. **Air Commodore F. R. Banks**, C.B., O.B.E., **Dr. S. F. Dorey**, C.B.E., F.R.S., **Sir Lynden Macassey**, K.B.E., K.C., **Vice-Admiral (E) the Hon. D. C. Maxwell**, C.B., C.B.E., and **Lieut.-Gen. Sir Frederick G. Wrisberg**, K.B.E., have been re-elected

vice-presidents. **Maj.-Gen. H. E. Pyman**, C.B., C.B.E., D.S.O., has also been elected a vice-president. **Mr. H. B. V. Teague** (Crossley Brothers, Ltd.) has succeeded Mr. J. Jones as chairman of Council.

The East Midlands Area finals of the **Electrical Industries Benevolent Association** National Golf Championship will be held on 11th September at the Notts Golf Club, Hollinwell, near Mansfield, Notts.

Mr. F. E. Saunders, who joined W. T. Henley's Telegraph Works Co., Ltd., in 1926 and was appointed assistant manager of the

Mr. F. E. Saunders

Mr. A. V. Morgan

company's Glasgow Branch at the beginning of this year, was appointed manager of that branch on 17th August. He succeeds **Mr. W. S. Campbell**, who relinquishes the position of manager of Henley's Scottish Branches on retiring from full-time employment with the company after forty years' service. Mr. Campbell's services will, however, be retained in a part-time capacity.

Mr. A. V. Morgan, who joined Henley's in 1925 and was subsequently promoted to the position of sub-branch manager of Henley's Aberdeen Branch, is now appointed branch manager.

Mr. Bentley Jones, whose portrait we reproduce herewith, has been appointed a director of Thorn Electrical Industries, Ltd.

Mr. B. Jones

In referring to the appointment of **Dr. W. G. Radley** as Engineer-in-Chief of the General Post Office in our last week's issue, we stated that he was at present, in addition to being Deputy Engineer - in - Chief, Controller of Research in the Engineering Department. The latter position is held by **Brig. L. H. Harris**, C.B.E., who succeeded Dr. Radley as Controller of Research some time ago.

Mr. H. Streets, formerly chief technical engineer of Richard Sutcliffe, Ltd., has now been appointed technical director of the company.

OBITUARY

Mr. E. J. Page.—The death occurred on 10th August of Mr. Edgar John Page, M.I.E.E., who with Mr. H. J. Miles was the founder of the electrical contracting business of Page & Miles, Ltd., Brighton, in 1888. Mr. Page, who was in his eighty-eighth year, began his career as an ironmonger's assistant but later joined the Hammond Company's electricity undertaking in Brighton. His firm was responsible for many of the early electrical installations in the Brighton area.

The funeral took place on 13th August when, apart from members of the family and the company, there were present representatives of the Electrical Contractors' Association and the South Eastern Electricity Board.

Mr. W. J. Smither.—The death has occurred of Mr. William James Smither, who for twenty-five years was borough electrical engineer at Dorchester. He retired in 1947.

Mr. T. W. Graves.—The death occurred on 11th August of Mr. T. W. Graves, A.M.I.E.E., who, until his retirement in 1940, had been a senior assistant in the Chief Engineer's Department of the London County Council. In his early days Mr. Graves was with the Electricity Departments of the Hampstead and St. Pancras Borough Councils and he joined the L.C.C. in 1903. His work was mainly concerned with the testing of meters and carrying out the duties of the electrical inspector in which capacity he was well known to most supply engineers in the London area.

Mr. W. M. Lydall.—The death occurred on 11th August of Mr. William Morris Lydall, M.I.E.E., chairman and managing director of the Yorkshire Electric Transformer Co., Ltd., which he founded in 1925.

Mr. H. G. Brown.—The death is reported at Tunbridge Wells on 20th August, at the age of seventy-six, of Mr. Harold Gilbert Brown, formerly managing director of the Westinghouse Brake & Signal Co., Ltd. Mr. Brown had been a member of the Institution of Electrical Engineers since 1908.

WILLS

Mr. Alan Wright, a former director of Best Products, Ltd., who died on 8th March, domiciled in South Africa, left estate in England valued at £2,530 gross (£2,527 net).

Mr. H. Clarkson, electrical factor, Morecambe and Barrow-in-Furness, who died on 21st November, left £36,617 gross (£36,541 net).

Engineering and Marine Exhibition

Preview of Electrical Exhibits

THE eighteenth biennial Engineering and Marine and Welding Exhibition (30th August to 13th September), which this year incorporates the Foundry Trades Exhibition, is to be opened at Olympia, London, next Thursday, when it will introduce home and overseas buyers of engineering products to what will undoubtedly be the most comprehensive display of engineering capital goods and equipment yet seen in this country. The exhibition will be open each weekday from 10 a.m. until 8 p.m. and a record number of overseas visitors is expected.

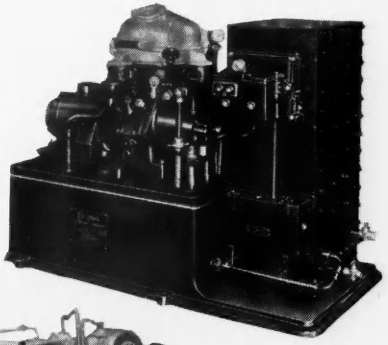
During the exhibition 70 trade and technical associations will pay special visits when they will be officially received. The chief sponsoring organizations include the British Engineers' Association, the Society of Motor Manufacturers and Traders (Marine Section), the British Electrical and Allied Manufacturers' Association, the Institute of Welding and the British Acetylene Association.

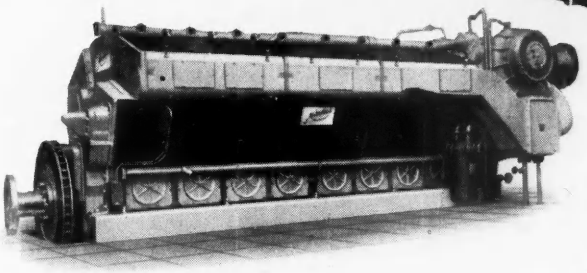
The products of the British engineering industry made a significant contribution to the increase in the level of production in 1950 by 40 per cent above the figure for 1946. Manufacturers of industrial machinery and equipment have set an example by producing 70 per cent more goods last year than in 1946. Engineering exports, including electrical goods and vehicles, were valued at £808 million in 1950, the highest figure ever recorded.

On the marine side, the United Kingdom continues to maintain its leading position in the construction and launching of shipping. In 1950 the tonnage of merchant shipping launched was 1,325,000 tons, over one-third of the world's recorded total and the highest figure for 20 years. The only other country which launched over 10 per cent of the world's total was the United States (437,000 tons).

Over 400 manufacturers are to be represented, about a quarter of them being either wholly or partly electrical. The exhibits will cover a very wide range of engineering products, from the smallest to the largest, and a large proportion of them will be shown actually in operation.

An outstanding section of the show will be that devoted to internal combustion engines for industrial and marine use. Over thirty firms will be showing engines of one type or another. One of the highest powered diesel installations on view will be





Above: **Alfa-Laval automatic centrifugal separator for turbine lubricating oil treatment**

Left: **Mirrlees 2,270 b.h.p. 900 r.p.m. oil engine shown by the Brush-Aboe Group**

a Crossley 3,000 b.h.p. marine unit comprising two 8-cylinder engines, running at 3,200 r.p.m. and driving a single propeller shaft at 128 r.p.m. through electromagnetic slip couplings and a 2½:1 reduction gear. Some of the larger engines will be shown in model form; for example, Richardsons, Westgarth & Co., Ltd., will be showing a working model of a 5,000 h.p. North-Eastern Doxford marine oil engine. As an illustration of the importance of British engines to the export trade it should be noted that W. H. Dorman & Co., Ltd., who will be showing a fully-sectioned, four-cylinder diesel slowly rotating to demonstrate its internal working, export 80 per cent of their engines and generating sets.

One of the largest displays of engines ever exhibited will be on the " double-decker " stand of the Brush-Aboe Group. There will be thirty engines capable of supplying power for every type of need: industrial, marine, agricultural, traction and lighting. The exhibits of the National Gas & Oil Engine Co., Ltd., cover a wide range of sizes from 3 to 2,000 b.h.p. and there will be typical units for marine propulsion and auxiliary purposes and also vertical and horizontal industrial engines. Leyland Motors, Ltd., will have a 60 kW, a 36 kW and a special purpose generating sets, while C.A.V., Ltd., will show fuel injection and electrical equipment for marine and industrial engines.

In addition to the engines essential ancillary equipment will be exhibited. For example, the purification of oil will be illustrated by the Alfa-Laval Co., Ltd., Stream-Line Filters, Ltd., and Auto-Klean Strainers, Ltd. The first-named company will also show a range of centrifuges covering a wide variety of applications. Other centrifuges will be shown by Sharples Centrifuges, Ltd.

Standardized Motor Components

Apart from examples from its extensive range of diesel engines for traction, industrial and marine use, the English Electric Co., Ltd., will show electrical machinery and control gear for each of these applications. Among the many motors will be f.h.p. machines from one-twentieth to 1 h.p. based on the standardization of components used in combination to build thousands of motors differing either mechanically or electrically.

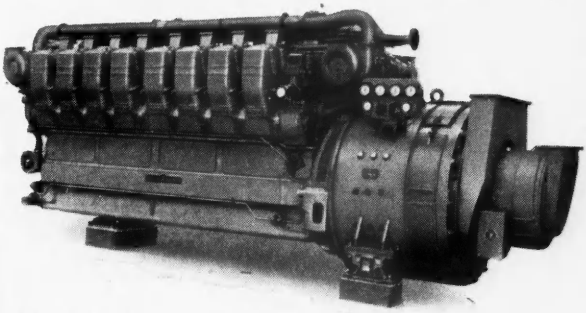
In view of their physical bulk boilers are difficult to include in an exhibition except in model form, but Fraser & Fraser, Ltd., will have one of their water tube boilers on view. The development of this type of boiler is traced by means of models on the stand of Babcock & Wilcox, Ltd., from the first one which was made nearly a hundred years ago to the complex steam raising plant of the modern power station. There will also be models of various types of marine boilers alongside models of the ships in which they are installed. A new high duty Lockheed rotary grate drive unit is to be exhibited by the Automotive Products Co., Ltd. It exerts a normal working pawl effort of 14·7 tons, but this can be increased by 50 per cent for short periods.

Waste Heat Utilization

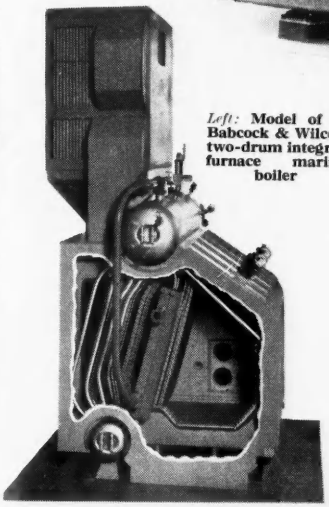
Gas and water turbines will also be well represented. For example, John Brown & Co., Ltd., will show a model of the 700 kW closed-cycle gas turbine now being built at Clydebank for the utilization of the waste heat from Foles Hill gasworks, Coventry, while Ruston & Hornsby, Ltd., will include such varied items as a cut-away model of a gas turbine driving a 750 kW alternator and a new type of 10 ton narrow gauge diesel locomotive. One of the most interesting exhibits will be a test rig embodying a scaled-down combustion chamber of a gas turbine which will be demonstrated by Shell-Mex & B.P., Ltd.

Typical of the exhibits of the steam turbine makers will be a completely bladed h.p. shaft for a 60 MW, 3,000 r.p.m. turbo-alternator made by C. A. Parsons & Co., Ltd., which is designed to operate with steam at 900 lb/sq in and 900 deg F. Other exhibits include a $\frac{1}{3\frac{1}{2}}$ scale model of a 10 MW gas turbo-alternator, which is being built for the National Gas Turbine Establishment at Farnborough, and a model of a hydrogen cooled turbo-alternator. A cast steel h.p. steam turbine casing for a 30 MW turbo-alternator is one of the principal exhibits of the David Brown Group who will also show a diesel marine engine, gears and gearboxes and " Coventry " geared motors. Geared motors will also be shown by Crofts (Engineers), Ltd.

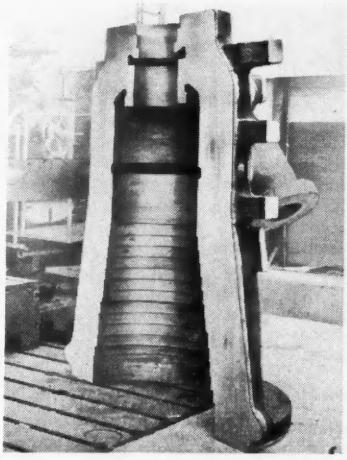
With regard to water turbines, visitors will see a miniature hydro-electric power station incorporating a working turbine generator unit made by Gilbert Gilkes & Gordon, Ltd., working under an artificial head of 90ft and developing up to 9 h.p.



Right: **English Electric 2,000 b.h.p. 850 r.p.m. power unit for main-line diesel-electric locomotives**

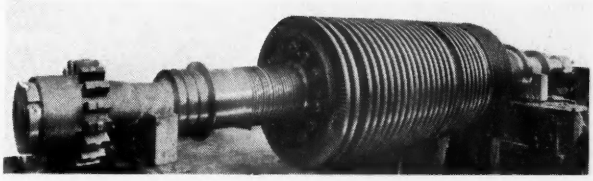


Left: **Model of a Babcock & Wilcox two-drum integral furnace marine boiler**

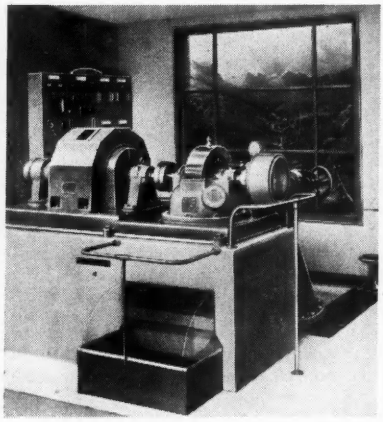


Right: **Cast steel h.p. casing for a 30 MW turbo-alternator shown by the David Brown Group**

Above: **Smiths' "Monogauge" vacuum indicator**



Right: **High-pressure shaft of a 60 MW Parsons turbo-alternator**



Gilbert Gilkes & Gordon miniature hydro-electric power station

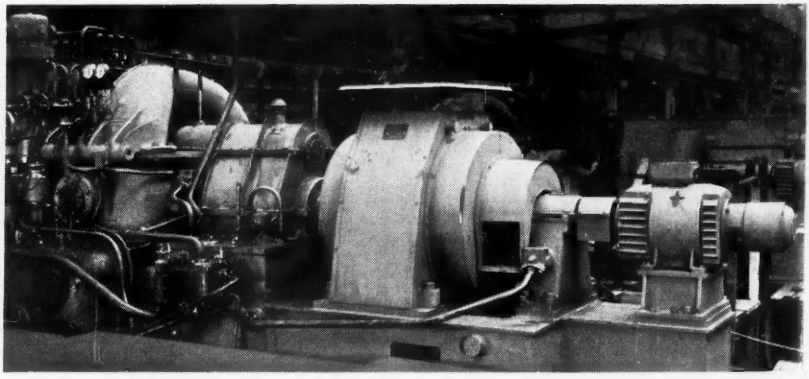
With the complexity of modern equipment, scientific instruments have often to be specially developed. The Accurate Recording Instrument Co., Ltd., for instance, has a liquid expansion thermometer made for the brewing industry, with a range of 50 deg, to 70 deg, accurate to 0·1 deg F throughout its scale range.

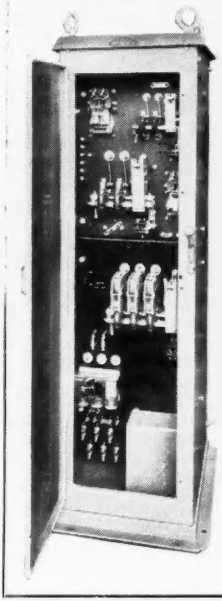
Apart from a revised type of rudder indicator and a circular disc recorder, the new products to be displayed by Evershed & Vignoles, Ltd., include a " Dionic " meter measuring steam purity by the electrical conductivity method which has been developed and is used in conjunction with the Evershed-Straub degassing condenser. Smiths Industrial Instruments, Ltd., will have counting and speed indicators, the heavy duty " Desynn " system of remote indication, and a new range of pressure and vacuum gauges, which are known by the trade name " Monogauge." They are available with dial diameters of 2, 3 and 4in.

Pumps for handling many difficult substances will be on view. The Hamworthy Engineering Co., Ltd., will display pumps for viscous liquids such as bitumen grade oil, hot waxes and molasses, together with an 8in rotary horizontal cargo oil pump. A compressed-air operated ejector pump made by Gresham & Craven, Ltd., will be shown pumping green peas suspended in water, and the Comet Pump & Engineering Co., Ltd., will have a working model of a pump handling what was hitherto regarded as an unpumpable grease. One of this company's pumps can also handle iron filings and general foundry fettlings. Boiler feed pumps are to be shown by G. & J. Weir, Ltd., together with a two-stage two-crank motor driven air compressor with a working pressure of 450 lb/sq in and an ammonia compressor for refrigeration service.

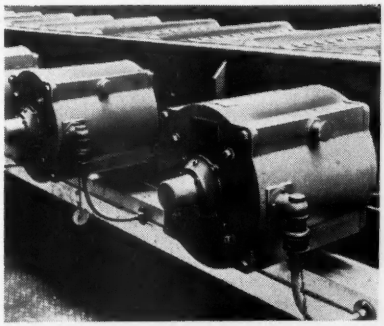
The electrical section of the exhibition will be most comprehensive and will include such varied items as alternators, batteries, cables, motors, generators, switchgear and industrial X-ray apparatus. Among the motor manufacturers E. R. & F. Turner, Ltd., will display a range of totally enclosed " Bull " motors built to

One of six B.T.H. 600 kW geared turbo-alternators with combined condensers for the British Tanker Co.

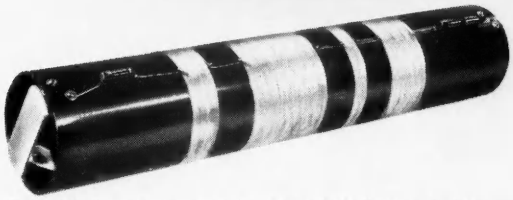




Right : **Laurence, Scott & Electromotors "floating" motors driving rollers on a run-out table**



Left : **Brookhirst stator-rotor starter**



Radio interference suppressor for electrostatic dust precipitators (Tufnol, Ltd.)

N.E.M.A. dimensions. They are thus interchangeable with American machines and are suitable for installation in any part of the world.

In addition to examples of machines and other equipment for marine use the Electro Dynamic Construction Co., Ltd., will show h.f. alternators and convertors for gyro compasses, radar, echo sounders, etc. One set will be running with an oscilloscope demonstrating the waveform. The Electrical Power Engineering Co., Ltd., will exhibit industrial machines of up to 25 h.p. as well as its range of industrial electric truck and traction motors. Mawdsley's, Ltd., will demonstrate a 9 b.h.p. squirrel-cage induction motor being tested against a torque reaction dynamometer to enable visitors to study its starting and load characteristics.

A comprehensive range of newly designed a.c. and d.c. motor starters for industrial and marine service will be shown by Brookhirst Switchgear, Ltd. A feature of this range is extreme adaptability, the basic components being so designed that from them there can be provided readily a variety of combinations and also variety within each combination. Another exhibit will be the unit built "Unibord" motor control equipment which comprises an angle iron framework with busbar chamber and contactor starters for motors up to 200 h.p.

The exhibits of the British Thomson-Houston Co., Ltd., will be representative of its practice in electric propulsion equipments, ships' electrical auxiliaries, marine radar and electrical plant for dockyard and general industrial use. The display will range from a 12 ton gearwheel as used with diesel propulsion units incorporating electromagnetic couplings, developments in gas turbines, high breaking capacity switchgear for marine service, down to electric speed indicators and magnetos for marine engines. There will also be a new range of totally-enclosed fan-cooled motors with standardized dimensions.

A 55 kV electron microscope with a magnification of 12,000 will be among the exhibits of the Metropolitan-Vickers Electrical Co., Ltd., which will also include a model of a 17·1 MVA 11·5 kV vertical a.c. generator driven by a Boving water turbine and made for the Kiewa hydro-

electric scheme in Australia, a model of a 9,000 h.p. winder for Mosley Common Colliery, a recently developed magnetic crack detector and an electronically controlled reel drive for the textile and paper making industries.

In association with its " Speedmaster " single unit variable frequency convertor Laurence, Scott & Electromotors, Ltd., will demonstrate a squirrel-cage motor of the " floating " type which has been designed for driving rollers on run-out tables, etc. The motor stator is anchored only by a resiliently fixed torque rod and the rotor and stator are free to accommodate themselves to any distortion in the mechanical gear. Other exhibits include variable speed a.c. motors and electrically operated cargo winches.

Infinitely variable speed electronic control equipment with associated d.c. motors, including the new " Multi-Speed " drive, will be demonstrated by M.T.E. Control Gear, Ltd., together with a variety of other motor control gear, a.c. air-break contactors, timing devices and thermal overloads.

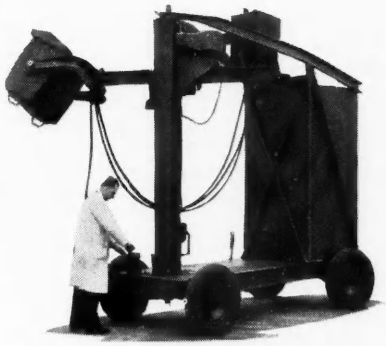
A display by George Ellison, Ltd., will embrace switchgear including h.v. and m.v. switchboards, starters for slip-ring and squirrel-cage motors, circuit breakers for power distribution and direct-on starting, crane control gear, a selection of limit and emergency switches, and cable fittings and accessories.

A wide range of electromagnetic and permanent magnet equipment covering the requirements of many industries will be shown by such firms as Electromagnets, Ltd., and Rapid Magnetic Machines, Ltd.

Comprehensive displays of marine and industrial cables will be seen on the stands of both W. T. Henley's Telegraph Works Co., Ltd., and British Insulated Callender's Cables, Ltd. The latter will also show a wire rope parting machine which is the first of its kind to be marketed. It parts wire ropes in such a manner that the ends are sealed and left in a tapered form, thereby facilitating threading through blocks or pulleys and any subsequent clamping.

An exhibitor of industrial X-ray equipment will be Newton Victor, Ltd., who will display a mobile 250 kVp model for the examination of steel up to 3in thick; it is jib-crane mounted to provide a wide range of movement.

A variety of electric and pneumatic tools



Newton Victor 250 kVp industrial X-ray unit

will also be on view ranging from portable motor operated planes made by the British Equipment Co., Ltd., to the fourteen electric drill and screw guns shown by Desoutter Bros., Ltd. Two " Metco " metal spraying guns will be demonstrated by the Metallizing Equipment Co., Ltd., one of which is capable of depositing all metals in wire form in connection with the reclamation of worn or mis-machined parts. The other gun is for the high-speed spraying of anti-corrosive coatings using $\frac{1}{16}$in diameter wires.

Tufnol, Ltd., will show many components produced from " Tufnol " including a choke coil wound on a 4in diameter 21in long former, which has been adopted as a means of suppressing radio interference emanating from electrostatic dust precipitators.

Air conditioning equipment will be displayed by Keith Blackman, Ltd., together with specialized fans and blowers and dust exhausting and collecting apparatus. Conveyancer Fork Trucks, Ltd., will show an electric truck having a lift capacity of 2,000 lb at 20in load centre.

Some of the latest types of marine radar equipment will be included in the exhibition, such as that made by Kelvin & Hughes (Marine), Ltd., who will also show depth sounders. Redifon, Ltd., will have full-scale replicas of wireless rooms of a modern marine vessel and deep-sea trawlers, complete with transmitters, receivers, radiotelephones, direction-finding loops, automatic alarms and sound amplifying equipment.

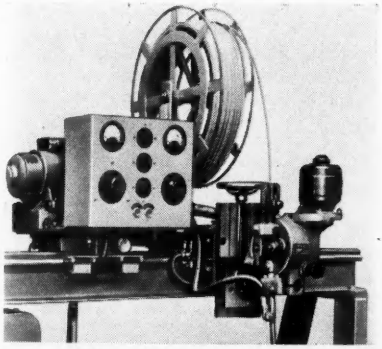
A special section of the exhibition will be

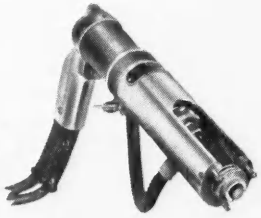
devoted entirely to welding where the demonstrations will range from the "Union-melt" submerged arc automatic welding equipment made by the Quasi-Arc Co., Ltd., to the argon arc welding of aluminium alloys, magnesium, copper, stainless steel and heat resistant nickel alloys by the British Oxygen Co., Ltd. The former company will also show a complete range of new-designed a.c. arc welding single-operator oil-cooled transformers, a motor generator unit and a diesel driven 300 A mobile welding unit.

Control panels for spot and seam welding machines shown by the British Thomson-Houston Co., Ltd., will include a selection from its extensive range of synchronous control panels comprising an ignitron contactor unit utilizing two ignitrons with a maximum rating of 1,200 kVA; an ignitron panel for the control of welds up to half-cycle duration; and a synchronous panel using thyratrons, instead of ignitrons, for welding machines up to 10 kVA.

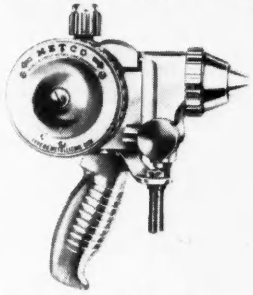
The latest item to be shown by Murex Welding Processes, Ltd., will be a self-contained air-cooled 50 A transformer welding equipment. It has a current range of 20 to 50 A at 90 V open circuit and as the set is of the moving coil type, the range is infinitely adjustable. Other new equipment to be shown includes a 250 A transformer equipment, electric arc welding electrodes and a low-voltage "fail-to-safety" device for a.c. welders.

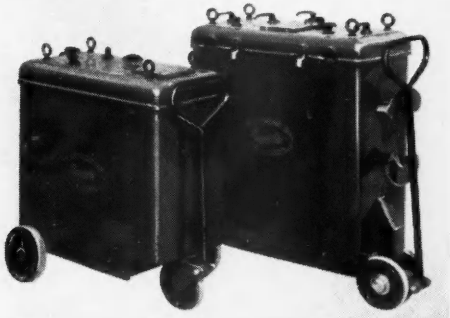
The exhibits of the General Electric Co., Ltd., will include portable single-phase and twin-arc a.c. arc welding sets. The portable twin-arc set represents a big advance in the design of a.c. welders as it takes a balanced three-phase load at a high power factor, without the expense of a correction capacitor. By using an arrangement of



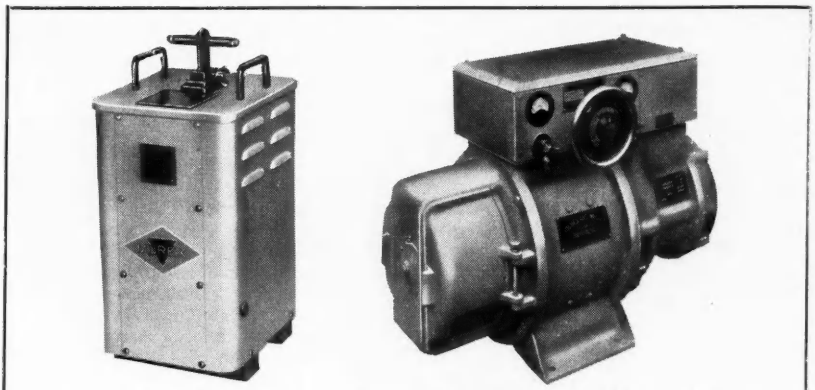


Above: **Cyc-Arc improved stud welding hand tool.** *Left:* **Metropolitan-Vickers automatic arc welding machine**





Above: **"Metco" metal spraying gun**
Right: **Quasi-Arc redesigned oil-cooled welding transformers**



Murex 50 A transformer arc-welding equipment and (right) Reyrolle 20/300 A welder with concentric dual control

two parallel electrodes insulated by their normal flux coating and fed from a three-phase to two-phase transformer there is a great improvement in arc stability which makes it so easily controllable that it is difficult, even for a complete novice, to deposit a bad weld.

Cyc-Arc, Ltd., will show its latest stud welder comprising the type " E1 " controller and type " D " portable hand tool, which now embodies an improved electronic timer with separate coarse and fine controls, while the Metropolitan-Vickers Electrical Co., Ltd., will demonstrate the electronic control of deposition of weld metal. There will be a short gantry equipped with a rail track for a standard travelling carriage, which will be complete with an operator's automatic control panel and reel of coiled electrode. The electronic control regulates the feed of the electrode to suit variations in arc length, the closeness of the control making possible the use of a short arc, a high rate of deposition of weld metal and thus a high welding speed. Other equipment on view will be an atomic hydrogen welder, an air-operated spot welder and a lightweight portable spot-welding gun.

The well-known " Nelson " stud welding equipment will be exhibited by Crompton Parkinson, Ltd., together with a display of " Young " marine batteries, motors, measuring instruments, ships' cables, lamps and lighting fittings.

Apart from switchgear and variable speed a.c. commutator motors A. Reyrolle & Co., Ltd., will have among a representative selection of their welding apparatus a 20/300 A a.c. motor driven single-operator welding generator, with a new dual concentric control. This enables the most suitable setting for a particular welding run to be readily selected by means of the outer handwheel, after which operation of the inner concentric knob provides adjustment to suit welding conditions.

The comprehensive range of resistance welding plant to be shown by Sciaky Electric Welding Machines, Ltd., will include pedestal spot, portable spot, projection, seam and flash welding plant which the company will be showing in operation.

The Department of Scientific and Industrial Research is demonstrating the control of plant for the recovery of ammonium sulphate and sulphur, both of which are valuable products from power station flue gases. A 25,000 cu ft/hr installation is now in operation at the Fuel Research Station. The process is the Fulham Simon-Carves ammonia method. A vapour pressure recorder designed by the originators of the process is now included in the equipment and has enabled conditions to be established that will permit satisfactory control. The estimated cost of producing ammonium sulphate in this way in 1950 was much greater than the then market price for this product, but change in market prices may alter the situation.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted or the opinions expressed by correspondents.

Southern Board's Tariff

THE announcement by the Southern Electricity Board of the domestic tariff proposed to be introduced on 1st October poses questions of fundamental importance. First, there is the difference in charges arising from no other reason than that consumers live in houses of different sizes. Consequently, if I live in a house with a large living room, a kitchen and two bedrooms, then to buy 750 kWh a quarter will cost £3 8s 5d. If, however, I move to a different house with, say, twelve assessable rooms, then I am charged 40 per cent more for the same quantity used for the same purpose.

This principle should not be conceded until the Southern Electricity Board has satisfied the consumers as to its authority for attempting to operate a system which may be equitable in regard to rates and taxes, but appears to be not only unfair, but an impertinence when related to the purchase of fuel.

Secondly, this form of tariff actively discourages and places at a financial disadvantage the householder who is sufficiently public spirited to attempt to save 20 per cent on his consumption. A man in a given size of house consuming 750 kWh/quarter will involve himself in a charge of 1·53d/kWh. Let him cut his consumption by 20 per cent to 600 kWh, in response to the national appeals, and his costs become 1·7d/kWh—an increase of 11 per cent.

Thirdly, the inadequacy of the distribution networks of the Electricity Board is limiting many people in their use of electricity. I would gladly use three times my present consumption, to replace heavy expenditure on solid fuel, for cooking pig and poultry food, for greenhouse heating, early food crops, lighting and heating of chicken houses, to get more eggs, and similar uses. If, therefore, the local electricity mains were of a reasonable size, my consumption would of necessity be in the neighbourhood of 2,250 kWh/quarter. At that rate it would cost me 1·09d/kWh, but in fact I have to pay now 1·53d, which is nearly 50 per cent more, and this for an inadequate supply.

Clearly, with such a tariff there is no inducement to the Southern Electricity Board to improve its service.

I am sending a copy of this letter to the Electricity Consultative Council, asking it to explain any errors in my three objections to this new tariff, and also the grounds on which it was persuaded to accept such a peculiar proposal.

J. MORTIMER HAWKINS.

London, E.C.4.

Appliances for the Home

I AM most interested in your leading article of 10th August on the effects of the raw material shortage on appliances for the home and quite agree that the official attitude appears to be that their manufacture is undesirable because power shortage is aggravated by their use. The choice of the term "appliances" may perhaps be unwise owing to general acceptance of this word as synonymous with "gadgets," when, of course, it covers the entire range of electrical equipment for the home, including cookers and washing machines.

If the defence programme is to be implemented, obviously the manufacture of equipment for the home must be curtailed; but, because of a general misunderstanding of the present difficulties with the generation of electricity and of the real solution, there is danger of officialdom virtually stopping the supply of electrical appliances while continuing to allocate materials for gas and solid fuel.

It should not be overlooked that, particularly in the rural areas, electricity is frequently the only convenient fuel, but in any case surely, despite shortages, the British housewife is entitled to a free choice.

The foregoing arguments do not, however, seem to carry much weight with official minds and it does not seem to occur to them

that restricted production would not in fact, add to the peak load, as it would not suffice to replace obsolete equipment already connected to the mains; secondly, that obsolete equipment is uneconomic, and replacement by modern equipment would mean the use of less electricity; thirdly, that, since no modern factory can remain in production on orders for spares alone, a lack of new equipment will inevitably lead to a lack of replacement spares as well; and fourthly, that before British housewives can leave their homes to augment the labour market, the electrical industry must be allowed to meet their vital need for modern equipment to replace apparatus that was already old when they answered a similar call ten years ago.

WOMAN IN INDUSTRY.

Peak Load Control

I CANNOT understand Mr. Devon's suggestion (3rd August) that having two substations, each supplying the domestic load of two sections of the community, one of which has peak load at midday and the other in the evening, proves that the domestic habits of a selected community show little diversity.

It is because of the difference in the times when domestic consumers use their apparatus, in a district where two-thirds of the tenants of dwellings cook by electricity and the connected load averages not less than 10 kW a consumer, that a consumer's peak load on the district bus bars does not reach $1\frac{1}{8}$ kW on weekdays. Mr. Devon's proposal is to divert material and labour at a cost of £10 a consumer to remove a small fraction of a kilowatt for each consumer from the peak load of a generating station.

As regards the diversity of water heaters I was using what I thought to be the same method as Mr. Devon when he gave the diversity as 50 per cent. In any case, my meaning was made clear when I pointed out what would probably happen when water heaters were reconnected with a diversity of 50 per cent as compared with 25 per cent. It would be interesting to see the amended costs of installing equipment to restrict 1,500 kW of water heating load.

I am not so sure as Mr. Devon appears to be that the peak load problem is not new. Can he tell us at what time of the day the peak load will occur ten years hence? Will it occur on a weekday? There are peaks in the morning, peaks at midday and peaks on Sundays. Every year conditions are changing. Are we to suppress a peak this year which in future years would improve the load factor in a given area?

In a district where the domestic load has been well developed the weekly load factor at the time of maximum load exceeds 50 per cent. Can we expect to improve very much on that? What is the annual load factor that Mr. Devon would have us strive for? Maintenance must be done and it is during light load periods that this work is carried out.

We could have done much better in the past few years by installing at selected points generating plant which was designed to take peak loads than we have done by restricting supplies. This is confirmed by the fact that the private generating plant installed in factories in one district is far greater than the load which has been shed at any time.

Let us get rid of this negative frame of mind, which seems to satisfy many others besides Mr. Devon.

B. CROWSLEY.

Welwyn Garden City, Herts.

IN his article (*Electrical Review*, 6th July) Mr. Devon put forward three methods for levelling off peaks in the demand on power stations. Certain facts were absent; they are given below in order to present both sides of the problem.

Disadvantages of time switch control of water storage heaters are:—

(*a*) Cost of alteration to consumers' wiring to connect the time switch in the storage heater circuit only. This is estimated at 30s per consumer, including the installation of the time switch.

(*b*) Necessity for adjusting the on-off arms for summer and winter time.

(*c*) Inability of the time switch to cater for week-ends and certain holidays, thus causing unnecessary restriction.

(*d*) Tariff complications owing to concessions which may have to be offered to consumers for restricting supply to the storage heater.

Adequate reasons why frequency sensitive relays cannot be adopted for load reduction

were put forward in these columns (4th May) by the B.E.A. system operation engineer. It may be helpful to mention briefly two of these reasons here. They are that frequency sensitive relays would, in certain circumstances, cause unnecessary load reduction while load reduction is sometimes necessary at high frequencies to limit transmission line loadings.

Unless B.E.A. headquarters have altered their view, it is difficult to appreciate why Mr. Devon thinks that Electricity Boards will consider the use of frequency sensitive relays.

In the article it is assumed that 50 per cent of the heaters are available for load reduction with a loading of 3 kW per heater. It is suggested that these figures are high and that a 12½ per cent diversity is to be expected with an average heater loading of 2 kW.

Oldham. R. BUTTERWORTH.

Metering and Load Control

SOMEBODY having realized the heavy cost of meter reading, which entails labour, transport, clerks, calculators, etc., has suggested that as gas and electricity are both under national control, one man should read the gas and electricity meters.

For many years now, in parts of Canada, meters have been scrapped and replaced by an adjustable overload device, with a dropping resistance. If excessive load is taken, the armature in the overload operates, putting the resistance in series with the load and pulling down voltage, until load is reduced. I have heard this apparatus called the "hogging control." The supply concern and consumer know by past experience the average annual consumption and a yearly figure for a supply is agreed upon. Thereafter a fixed charge account is rendered quarterly.

During our present national electricity shortage, surely an overload control as described above could well be fitted into town supply feeder pillars in residential areas. Private consumers failing to answer appeals for load reduction would automatically lose their supply until the load was reduced, without the supply authority having to cut out everybody, including factories.

Why increase the cost of production by introducing nightshifts, entailing extra lighting, wage rates, etc., if domestic supplies can be controlled in the way I suggest.

Meter manufacturers could export surplus meters and would be well equipped to take up the production of load limiters.

CYRIL J. BENNETT,
Yeovil. *Chartered Electrical Engineer.*

Electricity—A Social Service

AS a community we are committed to the slogan, "No cuts in the Social Services." For the hard-pressed housewife, not to mention many others, electricity is the greatest social service of our age.

Those of us whose lives are devoted to the promotion of the efficient use of electricity (and thus of our dwindling coal supplies), find our medium must be cut often at inconvenient times and is to be denied apparently *sine die* to the thousands who still await and deserve this service.

Old Basing, Hants. M. V. ROGERS, A.M.I.E.E.

Hand-dryers in Schools

OUR attention has been called to a report in your 10th August issue with reference to the use of electric hand-dryers in schools and a statement made by the East Lothian Education Authority to the effect that it found the average time needed for drying hands was 40 seconds and that a class of 20 needed 13 minutes for the purpose compared with 4 minutes when towels were used, but otherwise the electrical appliance was preferable.

I feel that for the benefit of your readers we, as manufacturers for many years of a combined hand and face dryer, should elucidate certain points. With our machine two impinging currents of hot air are impelled vertically and reciprocally from two vertically mounted nozzles. The upper nozzle can be turned so that a current of hot air is directed forward from any angle. For quick use, therefore, two persons can dry their hands at one time if necessary.

There is a certain technique in using these hot air dryers in order to ensure the best results being obtained. When the hands are washed, they should be rinsed clear of all soap and all surface water shaken off into the toilet basin. The washing motion should then be continued vigorously in the stream of hot air and in normal conditions the practised user can

dry the hands at the most in 20/30 sec. It is not sufficient merely to hold the hands in the air stream and rely purely on the heat and evaporation to do the work. By continuing the washing motion and vigorously rubbing one hand on another, the process is speeded up very considerably.

It is quite obvious that if an unlimited number of towels is available, provided individual towels are used, towel drying is more comfortable and efficient, but for communal washing these days this is not feasible. If a roller towel is used, in a very few minutes it is not only partly saturated but dirty and germ laden. It is not possible to use soft towelling, which is scarce and laundering costs are excessive. If paper towels are used, apart from the fact that they are expensive, it is generally found that after use they are thrown on the floor and frequently find their way into the drains with serious results.

Intelligently used, these hot air dryers, apart from being extremely economical, eliminate the risk of the spread of contagious ailments, particularly various forms of skin eruptions, and also the spread of the common cold. Provided the right instruction is applied, they are ideal for use in school wash-houses.

The common supposition that use of the machine tends to cause chapping of the skin is fallacious, provided the hands are fully swilled and freed from soap before drying.

*London, N.W.*10. CRYPTO, LTD.
W. G. SWAIN,
Managing Director.

Protection of Wood Poles

WHILST reading with interest the article "Electricity in Rhodesia" which appeared in the *Electrical Review* of 13th July, I was surprised to see that wood poles were not favoured for overhead line supports by the Salisbury undertaking because of the prevalence of termites.

The group of companies with which I am associated use wood poles (eucalyptus) impregnated under pressure with high fixation Wolman salts (tanalith) as the poles in the area served are subject to attack by fungus, termites and borers. A net retention of 0·5 lb dry salt per cu ft of the total volume of timber has been found to provide the necessary resistance against all attacks. I also understand that this same retention is utilized at present by the Uganda Electricity Board for the preservation of its wood poles.

Pictures in the same article also appear to indicate the wide use of concrete poles with concrete crossarms in an area in which lightning incidence must be fairly high; surely this results in a much lower basic impulse insulation level of the lines which could be considerably improved by the use of hardwood crossarms.

Sao Paulo, Brazil. CHARLES E. BALL
(São Paulo Tramway Light & Power Co., Ltd.).

Power Station Plan Protest

AT the meeting of Wakefield Rural District Council on 15th August the plan of the British Electricity Authority to build a £12 million power station near Heath Common was discussed. Coun. J. H. Milne declared that there were plenty of other sites in the West Riding where the proposed Wakefield station could be built and he recommended the Council to support the public resolution from Warmfield-cum-Heath parish and formally object to the move to build the power station. A public inquiry should be sought. The resolution was seconded by Coun. W. B. Spurr and was adopted. Coun. Spurr appealed for an effort to be made to save the "Half Moon," a resort for anglers and picnickers, from destruction by tipping. Coun. J. T. Fisher said that although he would like to see the "Half Moon" safeguarded, he did not want the meeting to oppose the whole scheme. Mr. A. L. Perkin, of the West Riding Planning Department, said that the power station itself was not in the county planning area but in the city area. As a planning authority, they must only restrict themselves to that part of the project in their area and the County felt that the tipping proposals had been formulated so as not to detract from the amenity value of Heath and Kirkthorpe. He added that the "Half Moon" tip would not be a permanent blight as it would be restored.

Load-Spreading Periods

IT has been decided by the Regional Boards for Industry that the load-spreading periods from 1st November to 31st March shall be 8 a.m. to noon and 4 to 5.30 p.m. throughout the country. The London and South Eastern Regional Board has decided however, in view of the large number of commercial premises in its area, that the afternoon period shall be extended to 6 p.m.

Commerce and Industry

Supply Workers' Overtime Ban

Engineering Wages Claim

FOLLOWING the rejection of the British Electricity Authority's offer of a 5 per cent wage increase instead of the 10 per cent sought by the unions, the workers in two further stations in the Manchester area joined in the ban on overtime over the week-end, making a total of twenty-nine stations involved. Eighteen of the twenty-eight London stations are now affected, as well as nine in the Manchester district; Dunston and Littlebrook are the other two stations that have adopted the ban. The men are members of the Amalgamated Engineering Union, the Electrical Trades Union, the Transport & General Workers' Union, the National Union of General & Municipal Workers and the National Union of Enginemen & Firemen, which, however, have not "recognized" the men's action.

It was announced earlier this week that the B.E.A. and the unions had agreed to refer the dispute to the Industrial Court, but it was not expected that all the men would resume normal working pending an award by the Court.

Dollar Convention Report

Last March, at Eastbourne, a "Dollar Convention" was held under the auspices of the Dollar Exports Board (since replaced by the Dollar Exports Advisory Council). A full account of the proceedings is now available and copies may be obtained at 10s 6d each from the British Electrical and Allied Manufacturers' Association, 36, Kingsway, London, W.C.2.

The report gives particulars of those who took part in the Convention and reproduces the speeches made by the chairman of the Dollar Exports Board (Sir Cecil Weir), the Chancellor of the Exchequer (Mr. Hugh Gaitskell), the Minister of Supply (Mr. G. R. Strauss), the then President of the Board of Trade (Mr. Harold Wilson) and many others including Sir George Nelson, Mr. D. Maxwell Buist, the Earl of Verulam and Mr. E. Bruce Ball, who dealt with the electrical aspects of trade with Canada and the United States. A great deal of matter of interest and practical value to exporters is contained in the 179-page volume.

Control of Engineering

A "plan for engineering" was adopted at last week's conference of the Confederation of Shipbuilding and Engineering Unions. It envisaged the nationalization of some sections of the engineering industry, e.g., aircraft production and coal-mining machinery and statutory boards of control for other sections, including the radio industry.

In connection with the production of heavy electrical equipment it is proposed that an inquiry should be made by the Monopolies Commission into the activities of the British Electrical and Allied Manufacturers' Association, and the possibility of a board of control or nationalization of the principal concerns is hinted at. Other electrical equipment is left for later consideration and a suggestion is made that there should be a utility range of electrical appliances.

Hastings Illuminations

The castle ruins at Hastings have been floodlit with sodium and mercury lamps, which provide an effective and colourful contrast between the masonry and the foliage now covering parts of the ancient walls. The floodlighting equipment was supplied by the General Electric Co., Ltd., who have been responsible also for floodlighting St. Clement's Church. Several G.E.C. animated lighting features have been erected round the

One of the animated lighting features on the Hastings seafront

Marine Boating Lake at the eastern end of the front. They comprise a butterfly with scintillating effects, two dogs disputing the ownership of a bone, a juggler and a parrot. Large numbers of "Osram" 15 W internally coloured lamps were supplied for the fairyland strip decorating the lamp standards along the front.

Engineering Wages Claim

A unanimous decision to apply for an all-round increase of £1 a week in the wages of members of affiliated unions was made at last week's annual conference of the Confederation of Shipbuilding and Engineering Unions. If granted this would raise the minimum rates for a 44-hour week to £6 for unskilled and £6 18s for skilled workers. Over two and a half million workers are involved so that the annual addition to wages would be more than £125 million. It is the intention of the unions to insist on the maintenance of the extra rates paid for merit and in certain crafts and other "differentials."

E.T.U. Mission to Poland

Some general impressions of conditions in Poland were given by members of the Electrical Trades Union, who recently paid a visit to Poland at the invitation of the union of metal workers in Poland. The E.T.U. mission was headed by Mr. F. Haxell, assistant general secretary of the Union, who said that the mission was impressed by the welfare arrangements in industry and by the social services. The mission's tour included a visit to a power station and a cable works.

In reply to questions it was stated that Polish working-class flats now being erected compared favourably with those in this country. They were modern in design, but domestic electrical appliances were not used on a very large scale. Heating generally was either by central heating or by enclosed solid-fuel fires.

Battersea Fun Fair Lighting

In the accompanying picture we show the lighting of the vista rotundas and Gothic towers at Battersea Park Fun Fair. Drake & Gorham (Contractors), Ltd., were responsible for the lighting of this section and the remainder of the west end site under the direction of the consulting engineers, A. H. Barker & Partners. The company was also responsible for the electrical installation for the concealed tree lighting.

Micanite & Insulators Jubilee

On 20th August the Micanite & Insulators Co., Ltd., attained its fiftieth year. To mark the event the company has produced a well-illustrated brochure which is being given to every employee and to the company's friends and customers throughout the world. After a foreword by the managing director (Mr. Stanley M. Mohr) the company's history is outlined from the establishment of the business by the twin brothers Arthur and Edward Berkeley and their cousin, Max Mohr, who introduced the products of the American Mica Insulator Co. to Europe. The account tells of the growth of the concern and its developments in the production of Micanite, "Empire" varnished insulating fabrics, "Paxolin" laminated insulation, "Panilax," etc.

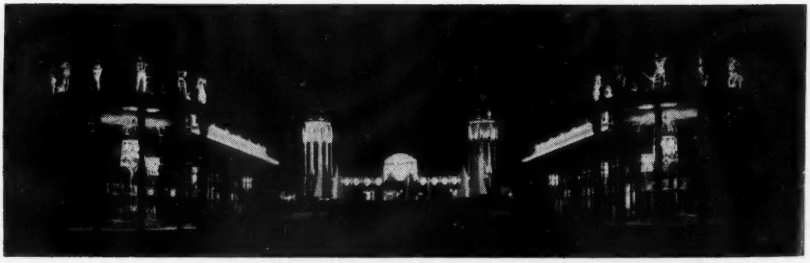
The personal side is represented by notes, with portraits, of past and present directors and a list of employees with twenty years' service or more and there are many pictures of the works, including the canteen kitchens and health centre.

Electricity Board's Training Scheme

A revised craft apprenticeship training scheme to be adopted by the South Western Electricity Board will give boys an opportunity of learning something of the Board's organization as a whole and of the wider ramifications of the industry. For the first eighteen months they will spend short periods in various departments to gain a wide knowledge of the Board's activities, after which they will receive specialist training for about 3½ years. The range open to them includes trades dealing with mains, wiring, meters, transport, workshops, drawing office and building.

The scheme is for boys of 15 or 16 years of age, and time and financial assistance will be given to them to attend a local technical college

Illumination of the vista rotundas and Gothic towers at Battersea Fun Fair



er school for approved courses. Suitable apprentices may be promoted at the end of the first eighteen months' training to the Student Apprenticeship Scheme leading to appointments on the technical staff.

Educational

Among the courses of lectures to be given during the forthcoming session of the Sir John Cass College, Jewry Street, Aldgate, London, E.C.3, is a course of ten lectures by Mr. L. A. Thomas of the research laboratories of the General Electric Co., Ltd., on "Crystal Physics." These lectures will be given on Thursday evenings, commencing on 4th October. The fee for the course is 25s and applications for enrolment forms should be made to the Principal of the College.

Recipes in Braille

Recently the Eastern Electricity Board sold a Frigidaire refrigerator to a blind consumer who later asked for a recipe book in Braille. On the manufacturers being approached they arranged for a complete replica of their standard recipe book in Braille to be specially prepared.

Steel Rationing

The Ministry of Supply announces that control over the distribution of the main forms of carbon steel will be introduced on 3rd December next. The present arrangements for controlling the distribution of sheet steel, tinplate, terneplate and blackplate will remain unaltered. A further announcement will be made about control over the distribution of alloy steel. The new arrangements will be similar to those in operation up to May, 1950.

Contract Price Adjustment Formulæ

The following are the latest figures for use in the B.E.A.M.A. contract price adjustment formulæ:—Rates of pay: The rate of pay for adult male labour at 18th August shall be deemed to be 120s. Costs of material: The index figure for intermediate products published by the Board of Trade on 18th August is 370·9, and is the figure for July.

Nickel Bans Postponed

The Ministry of Supply and the Board of Trade announce that, following representations by industries affected by the Nickel (Prohibited Uses) Orders, it has been decided that the date from which the nickel plating of articles listed in the second schedules to the Orders will be prohibited, shall be 1st October next instead of 22nd August. It has also been decided that the disposal of articles containing controlled material or which are nickel plated shall be permitted without licence up to 31st December next. Under the present Orders disposal was prohibited after 1st October and 22nd August respectively. These changes are being made to allow manufacturers more time to turn over to alternative methods of production and to dispose of existing stocks. Amending Orders giving effect to these decisions were issued on 21st August.

Transformers for Canada

The Aluminum Co. of Canada has placed a contract with Ferranti, Ltd., Hollinwood, Lancs, for power transformers totalling 400,000 kVA, to operate at 300,000 and 275,000 V. These transformers are to be installed at their new hydro-stations, Kemano and Kitimat in British Columbia, and are believed to be the highest voltage power transformers yet ordered in this country.

South American Television

When the Alcalde (Mayor) announced in a special broadcast, a few days ago, that Bogota was to have a television system he was also announcing yet another export order for a complete television system received by Marconi's Wireless Telegraph Co., Ltd. The installation will consist of a 5 kW vision transmitter, 3 kW sound transmitter, a television studio including tele-cine apparatus, and a specially constructed vehicle which will contain all the equipment necessary for televising special functions such as public ceremonies, theatre plays or sporting events.

Instrument Training Courses

The importance of instrumentation in modern industrial plant is generally recognized, and some of the larger instrument users have set up their own departments for training instrument engineers, but for many organizations this is not practicable. Elliott Bros. (London), Ltd., have for many years given training facilities to instrument users' staffs. The increased demand for instruction has led to the inauguration of regular training courses for which a special department has been established. These courses are available to employees of instrument users as a free service to industry. They are intended for engineers who have a basic knowledge of instruments and cover the theoretical and practical aspects of instrument maintenance and repair. These service training courses are held at the company's head office at Lewisham. Each course lasts three weeks and the number of persons for each session is limited to fifteen. Particulars of the scheme, for which no fees are charged, and vacancies for forthcoming courses are obtainable on request to the Service Training Department, Elliott Brothers (London), Ltd., Century Works, Lewisham, S.E.13.

New L.D.C. Canteen

A new works canteen has recently been brought into operation at the Willesden Works of Lancashire Dynamo & Crypto (Mfg.), Ltd. The opening ceremony was performed informally by Mr. D. C. Lorkin, joint managing director, in the presence of Mr. H. W. Bosworth and

Mr. J. G. Shaw, chairman and vice-chairman respectively, of Lancashire Dynamo Holdings, Ltd. The canteen is contained in a newly erected corner-site building immediately opposite the company's works. It is the first stage of a two storey building designed to provide accommodation not only for catering but for music, dancing, concerts and shows. The interior accommodation is divided into four sections: the main canteen which seats two hundred persons, a staff dining room seating forty, an executive dining room for twenty people and a well equipped kitchen with a chef's office, store, refrigerator rooms and other offices. The main canteen, when used for social activities, will seat several hundred people and is readily transformed into a theatre, as a permanent stage, fully equipped and provided with elaborate foot and spot lighting, is at one end of the hall.

I.E.S. Register

The first annual issue of the Register of Lighting Engineers has recently been published by the Illuminating Engineering Society. Copies of the Register can be obtained on application to the Society, 32, Victoria Street, London, S.W.1.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £124 0s 0d
COPPER, H.C. Electro	ton £234 0s 0d
Fire Refined 99·7 per cent ..	ton £233 0s 0d
Fire Refined 99·2 per cent ..	ton £232 10s 0d
COPPER Tubes	lb 2s 2⅞d
Sheet	ton £284 10s 0d
H.C. wire and strip	ton £261 15s 0d
LEAD, English	ton £181 10s 0d
Foreign	ton £180 0s 0d
MERCURY	flask £73 10s 0d
TIN	ton £875 0s 0d
ZINC, G.O.B. Foreign	ton £190 0s 0d
Electrolytic	ton £194 0s 0d
BRASS Tubes	lb 2s 1½d
Sheet	lb 2s 4⅞d
Wire	lb 2s 7⅞d
PHOSPHOR BRONZE Wire	lb 3s 6⅝d
RUBBER, No. 1 R.S.S. spot ..	lb 43¾d–44½d

B.E.A.M.A. Dinner

The first B.E.A.M.A. dinner to be held since 1938 is to take place at Grosvenor House, London, W, on 15th November.

North Staffs University College

With reference to the description of the lighting installation of the new North Staffordshire University College at Keele Hall, Osler & Faraday, Ltd., inform us that in addition to the fittings supplied by Falk, Stadelmann & Co., Ltd., they supplied decorative fittings for many important positions.

Rural Preservation

REITERATING its anxiety to see an acceleration in the supply of electricity to rural areas, the Council for the Preservation of Rural England says in its report for 1950–51 that it endeavours to reach an understanding with the Electricity Boards which will lead to this result without undue injury to amenities. It therefore welcomes the accession of some of the Boards as associate members and refers in this connection to the papers read by Mr. C. T. Melling (chairman, Eastern Electricity Board) at a conference at Tunbridge Wells last October which dealt with the Electricity Board's problems in rural electrification.

The Council thinks that now the electricity supply industry has been nationalized there is a strong case for the reconsideration of the basis upon which rural extensions are charged for. It quotes the Lancashire Branch as suggesting that the capital cost should be spread over the country as a whole and shared by all consumers.

Opposition to the proposed Malvern Hills 66 kV line and the 275 kV line through the Tyne Valley and the Roman Wall National Park Area is mentioned; the Council has taken action in both cases.

The Council considers that much more could, and should, be done to avoid disfigurement of rural areas by low-voltage lines. Although it would like this distribution to be underground wherever possible, it realizes that the problem is an economic one and too great an insistence on this would result in delaying supplies to many rural consumers. Much could be done by careful routing but in exceptional cases the nationalized industry should be prepared to use underground cable. The Council is "concerned that there is little evidence of willingness on the part of the distribution authorities to give serious consideration to the placing of lines underground," although there have been a few cases of agreement.

In Lancashire joint inspection of proposed routes is carried out by a C.P.R.E. branch representative, officials of the Divisional Planning Committees and of the Electricity Board with, generally speaking, satisfactory results. This practice is commended.

Among other cases mentioned is the Lindscale–Roosecote 132 kV line, plans for which were modified by the B.E.A. as a result of representations.

To carry on the campaign against the proposed North Wales hydro-electric schemes a North Wales (Hydro-Electricity) Protection Committee has been set up. It will oppose the B.E.A.'s Parliamentary Bill and a Parliamentary fund of £5,000 is being raised for the purpose.

Opposition has also been offered to the proposed siting of a power station at Marchwood on the New Forest side of Southampton Water; to the proposed extension of the Meaford station; and a projected station at Littlemore.

Trolley-Bus Tractive Resistance

Standardization Based on Combined Tests

THE manufacturers of trolley-bus electrical equipment who are members of the British Electrical and Allied Manufacturers' Association have recently taken a valuable step towards standardization by obtaining correct trolley-bus tractive resistance curves based on combined tests carried out by five manufacturers.* A comparison of the figures previously used by the different makers for calculating vehicle performance revealed considerable divergence and, moreover, very few test data were available.

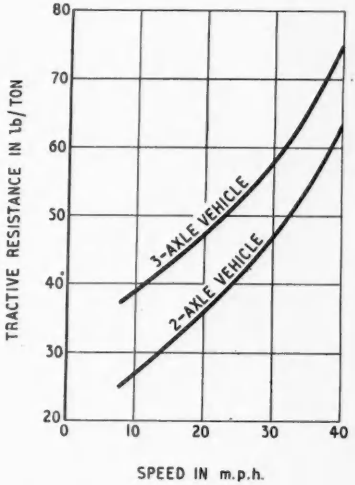
Figures from Actual Tests

As the actual value of tractive resistance greatly influences the performance of the vehicle, particularly the balancing speed, it is important that tendering companies should use accurate figures in order that the performance indicated by the calculated run curve may be realized in actual service. It was, therefore, decided that all the companies concerned should combine to obtain tractive resistance curves from actual tests on trolley-buses.

It was realized at an early stage that no purpose would be served by making motoring tests, as all the necessary results could be obtained more simply and more accurately from coasting runs, for the following reasons.

It is possible to obtain only one point on a tractive resistance curve by making a run at a balancing speed under power, whereas a coasting run affords points over the whole range of speeds through which the bus has coasted. Thus a very large number of motoring runs would have to be made to obtain a complete curve while only a few coasting runs are needed. Also tractive effort cannot be measured directly without special apparatus; in fact the electrical input to the motor must be measured and converted to tractive effort with the aid of the motor characteristic graph. This fact introduces the possibility of several errors, which do not occur in coasting.

The first series of tests was undertaken at Hastings on a two-axle double-deck trolley-bus. The reason for this choice was the stretch of straight well-made level road along the sea front. Three forms of recording instruments were used in order to compare and, if necessary, obtain average values of tractive resistance. They were a two-element cathode-ray oscillograph, a three-element Duddell oscillograph and a paper strip recorder marked by means of intermittent sparks from two sparking coils. One spark was fired at equal intervals of distance covered by the trolley-bus while the other was fired at equal time intervals. Distance impulses for the recorders were provided by a "fifth wheel" apparatus towed behind the vehicle. The variables recorded were speed, time and distance. Several runs were made in each direction. There was a virtual absence of wind.



Test graphs of trolley-bus tractive resistances

* British Thomson-Houston Co., Ltd., Crompton Parkinson, Ltd., English Electric Co., Ltd., General Electric Co., Ltd., and the Metropolitan-Vickers Electrical Co., Ltd.

A great deal of work was done in analysing the results of this first series of tests and two main factors came to light in the process. First the results obtained from the three recorders were remarkably consistent. Secondly the Duddell instrument proved to be the most useful in that photographic records of comparatively long runs could be made, whereas this did not prove to be possible with the cathode-ray oscillograph or the paper strip recorder.

Calculating Coasting Retardation

The second series of tests was carried out on the London Transport Executive system between Kingston Bridge and Hampton Court. A three-axle double-deck trolley-bus was employed and the Duddell recorder only was used, in conjunction with a "fifth wheel" apparatus. The road was sensibly level and straight and its surface was good. Nevertheless there was a survey and allowance was made for the gradients in calculating the coasting retardation (a gradient of only 1 in 400, which is normally negligible in trolley-bus work, will introduce an error of over 5 lb/ton). Several runs were made in both directions to nullify the effect, if any, of the slight wind. Oscillograph recordings were made of speed, time and distance, the speed trace serving merely as a guide.

Plotting the tractive resistance figures obtained from the two series of tests as lb/ton against speed showed a large difference between the curves for the two-axle and three-axle trolley-buses, the curve for the latter being the higher. Probably the factor accounting for most of this result was the difference between the losses in the gears and the effect of the extra rear axle.

The gear loss can be split up into gear face loss and oil churning loss. The former is a function of power transmitted and the latter purely a function of speed. Thus the gear face loss is properly shown on the motor characteristic graph while the churning loss is obviously incorporated in the tractive resistance curve, as it is a considerable drag on the vehicle and is included in the resistance measured when coasting. In view of the fact that the power taken in driving the motor during coasting is very small, the gear face loss is even smaller and can therefore be neglected.

The difference between the motoring and coasting tractive resistances is the sum of the motor and gear face losses. This additional loss is accounted for in the traction motor characteristic and should not be included in a motoring tractive resistance curve.

Though the tests were made only with double-deck trolley-buses, the curves obtained should in fact be applicable to single-deck vehicles. Since the frontal area of a single-deck bus is smaller than that of a double-deck type, the portion of the total resistance due to wind resistance will be less for the single-deck bus, which would mean a slightly smaller total tractive resistance in lb/ton. This being so, the use of the test curves in calculating the performance of a single-deck bus will err slightly on the pessimistic side.

As the gear loss has been divided in two and the churning loss included in the tractive resistance curves, the gear face loss has to be included in the motor characteristic graph and is to be specified at 5 per cent—that is, 5 per cent of the input to the gears—which will be (when motoring) the output from the motor, or (with rheostatic and regenerative braking) the output from and axle(s). For predicting the coasting retardation a figure of 0·4 m.p.h. per sec should be used. The range of speeds over which trolley-buses normally coast is so small that a fixed value is justified.

The manufacturers concerned express their appreciation to the Hastings Tramways Company and the London Transport Executive for the loan of trolley-buses and depot facilities and to Birmingham City Transport for the loan of the "fifth wheel" apparatus.

S.E. London Technical College

PARTICULARS are now available from the Department of Electrical Engineering and Applied Physics, South East London Technical College, Lewisham Way, S.E.4, of courses (mainly of the post-graduate type) commencing in October and November. They comprise courses in high-voltage engineering, electrical engineering economics, communication engineering economics, vector analysis and fundamental electromagnetic theory, communication networks, advanced laboratory work, electric power transmission problems, electric circuit theory, electronic instruments, paper-insulated cables, advanced mathematics for engineers and glass technology.

ELECTRICITY SUPPLY

Generation in July

Bulk Supply Scheme for Bristol

DURING the month of July, the total quantity of electricity generated by the British Electricity Authority, the North of Scotland Hydro-Electric Board and the Lochaber Power Co., was 4,057 million kWh, the increase compared with the corresponding month of 1950 being 8·8 per cent. For the first seven months of this year the total generated was 34,848 million kWh, an increase of 12·8 per cent as compared with January–July, 1950. The figures, as given in the Ministry of Fuel and Power returns for July, are shown in the accompanying table. At B.E.A. power stations the following plant was installed during the month:—Poole power station: 50 MW set and 300,000 lb/hr boiler. Thornhill: 200,000 lb/hr boiler. Braehead: 300,000 lb/hr boiler. Skelton Grange: 300,000 lb/hr boiler.

	Fuel consumed Thousand tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water power	Total*		
British Electricity Authority ..	2,316	3·6	3,948	11	3,965	3,721	14,777
North of Scotland	17	1·0	26	63	92	91	587
Total for July, 1951	2,333	4·6	3,974	74	4,057	3,812	15,364
Total for July, 1950	2,120	4·0	3,620	92	3,722	3,503	14,403
Increase or decrease, per cent ..	+10·0	+15·0	+9·8	−19·6	+9·0	+8·8	+6·7
Total for year to date (7 months)..	19,973	54·9	33,944	795	34,848	32,893	
Total for corresponding 7 months of 1950	17,807	38·0	30,057	733	30,885	29,143	
Increase, per cent	+12·2	+44·5	+12·9	+8·5	+12·8	+12·9	

* The total figure includes generation by oil engines amounting to 5·8 million kWh and waste heat plants amounting to 3·6 million kWh in July, 1951.

Cuts in Boards' Expenditure

According to the *Manchester Evening News*, the North Western Electricity Board has announced that while it will do its best to carry out its commitments in connection with housing estates and similar work until the end of the year it is unable to guarantee its ability to provide supplies to all new domestic property or even to new industries. A heavy cut has been made in the Board's expenditure programme this year and several rural extension schemes have had to be postponed. First consideration must be given to maintaining existing substations and mains.

The Southern Electricity Board is also reported to have stated that it will be unable to take on new consumers because of the drastic cuts in its permitted capital expenditure, although it will carry out contracts already made.

Breakdowns in North West

In the North West of England last week by a combination of adverse circumstances about 260 MW of generating capacity was out at a time of exceptionally high demand. Already about 170 MW of plant was being overhauled when a 60 MW set and a 30 MW set went out of action necessitating further power cuts to those already being made.

The Bolton generating set was on load again on Thursday last week but it was expected that the Stuart Street 60 MW set would be out for a fortnight. A boiler-house defect caused a 30 MW set at Stockport to be taken off load on 16th August but it was restored to service the following day.

Bulk Supply Scheme

To meet the growing demands from industry and the housing estates in Bristol for increased power, the South Western Electricity Board has embarked on a scheme, estimated to cost £284,000 over a period of some years, for the provision of a bulk supply point at Lockleaze, together with an area system control room, a meter testing station, garage and transport workshop. The bulk supply station, necessitated by the growth of load, particularly in the northern part of the city, will take a supply from the grid, transform the voltage from

132,000 to 33,000 V and distribute the current to centres in various parts of the city. Ultimately the new supply point will serve the whole of North and East Bristol, and the ultimate capacity of the station will be 480 MVA.

The site of nearly 12 acres is on high ground between the north western boundary of the housing estate and the railway line. It is large enough to accommodate a possible engineering depot in the future, as well as the meter block of 13,000 sq ft and the garage and transport workshop of some 15,000 sq ft. When the new station comes into operation, underground 33,000 V cables from Portishead which are at present supplying Bristol will be released to serve increasing industrial demands at Avonmouth and other places. After transformation to 33,000 V the supply will be controlled at Lockleaze and distributed to various distribution centres in Bristol by means of a bank of outdoor switchgear, the control and protective devices being installed within the control room.

More than 100 Bristol District transport vehicles at present garaged in scattered premises in the city, will be accommodated at Lockleaze, where central garage and repair facilities will improve efficiency and economy. The Meter Department there will be equipped for repair, reconditioning and testing of meters, at present carried out in temporary huts at Feeder Road. Site levelling for the switching station compounds and civil works, including road making, are proceeding at Lockleaze, where progress is also well advanced in the construction of the meter testing station and transport depot.

Appeal to Yorkshire Power Users

At a meeting of the East and West Ridings Regional Board on 14th August industrial and commercial power users in the area were urged to achieve a minimum saving of 20 per cent in the use of electricity during peak hours in the five months beginning 1st November next. The district committees, comprising representatives of employers, trade unions, Government departments, and electricity officials, will discuss plans during the next few weeks to attain this objective, the eventual schemes recommended being subject to regional approval.

Connah's Quay Station

The British Electricity Authority has applied to the Minister of Transport for consent under S. 34 of the Coast Protection Act, 1949, to the construction of intake and outfall works below high water mark of the River Dee at Connah's Quay, Flintshire. Representations or objections in respect of the application must be made to the Secretary, Ministry of Transport, Berkeley Square House, London, W.1.

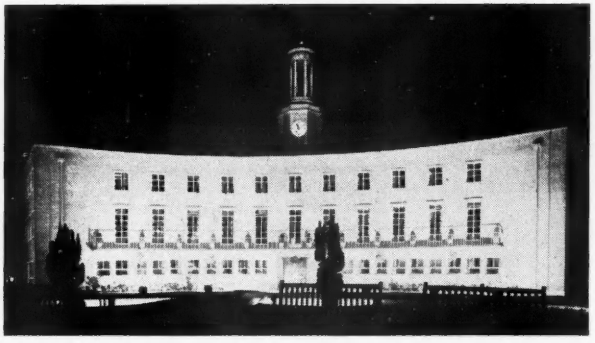
Street Lighting

SOUTHPORT Lighting Committee is to ask the Town Council for sanction to convert thirty-five streets from gas lighting to electricity. The capital expenditure on the scheme will be £19,000, including £5,738 for laying cables. It is estimated that as a result of the changeover there will be a saving of £1,233 a year in the cost of fuel consumption. It is also proposed to convert Church Street from gas lighting, which costs 1·42d an hour to keep each lamp burning, to sodium lighting, which costs 0·165d per lamp hour.

A Class "A" installation of Siemens "Wilton Sieray 3480" fluorescent lanterns has recently been put into commission on the Stockport-Potteries road at MACCLESFIELD, Cheshire. The lanterns, which house three "Sieray" 80 W fluorescent tubes, are mounted on Stewarts & Lloyds steel columns type GB 501 with a special adaptor plate. The initial installation of 29 lanterns has been followed by a further 15 lanterns. Control gear and lamps were supplied by Siemens Electric Lamps & Supplies, Ltd., and installation was carried out by the North Western Electricity Board.

Floodlighting at Friern Barnet

As part of its Festival of Britain celebrations, the Friern Barnet Urban District Council recently entertained a party of Dutch visitors, and during their stay the Town Hall was floodlit. The installation was carried out by the Eastern Electricity Board and consisted of six 1,000 W projectors placed 12ft from the building line and a further six 30ft from the building line.



The floodlighted Town Hall at Friern Barnet

Lord Citrine in Ireland

Study of Electricity Rationing

LORD CITRINE, chairman of the British Electricity Authority, who has been on a visit to Ireland, said in Dublin last week that although Ireland and England were near neighbours, their electricity problems could not be compared. Accompanied by Mr. R. Y. Sanders, deputy commercial manager, B.E.A., Lord Citrine spent some time in discussions with Mr. R. F. Browne, chairman, and leading officials of the Irish Electricity Supply Board.

He told the Irish News Agency that in England they had no fuel shortage, but a bottleneck caused by insufficiency of plant, plus excessive demand at peak hours. In Ireland there was a fuel shortage. One of the main reasons for his visit to Dublin was to study the Irish system of rationing electricity. He thought that in the conditions that existed in Ireland the Electricity Supply Board could have done nothing else. He did not say that the system would suit England; the details would have to be studied very much more before he could say that.

Lord Citrine said that he had been surprised to learn that only 54 per cent of Ireland's electricity supply was obtained from hydro-electric plant. In Great Britain coal was the main fuel used, and it would continue to bear the chief burden so far as could be foreseen now. Atomic power was out of the question for at least 20 years and though development of water power was planned the results would not be apparent for years to come. The Severn scheme would save a million tons of coal a year; but making a working model of it would take another three years, and it would be at least ten years before the scheme could be put into operation.

After referring to the B.E.A.'s programme of power station construction, he said that the B.E.A. was "actively discussing" with French electrical engineers the possibility of an interchange of supply between Britain and France, and that a similar exchange with Norway was being considered. The Norwegian project, he said, was much more difficult, and would involve about 350 miles of undersea cable. Such interchanges were common practice on the Continent. He understood, he said, that there was complete co-operation between the authorities in the Republic of Ireland and of Northern Ireland on the Erne hydro-electric scheme. Political boundaries were seldom obstacles to electricity exchanges.

Referring to the heavy peak loads on the British system, Lord Citrine said that they relied on appeals for voluntary restrictions on the use of electricity during peak hours, and on the staggering of hours in industry. They did not cut off consumers who failed to co-operate—they had not got the legal power to do so. In Ireland, he believed, there was power to disconnect those consumers who exceeded their ration.

Lord Citrine was to visit Ireland's peat-burning stations at Portarlington and Allenwood, and the Erne hydro-electric station now nearing completion. He mentioned that he was also in Ireland on holiday.

B.E.A. and Consultants

WHILE the staff of the British Electricity Authority is carrying out the design work for the majority of new power stations, a proportion of these projects is being entrusted to consulting engineers as a matter of policy. In coming to the decision to supplement the work of its own staff in this way, the Authority says that it has had in mind the widening of experience resulting from the utilization of the existing organizations of consulting engineers and the national importance of the work which consulting engineers do abroad.

Long-term agreements have been entered into with Messrs. Merz & McLellan, Kennedy & Donkin, and Ewbank & Partners covering the complete engineering and supervision of a number of stations in the Authority's future programme. Similar agreements for certain specific stations have also been entered into with Messrs. Preece, Cardew & Rider and Messrs. Strain & Robertson.

On the civil engineering and building side, the Authority is employing specialist consultants and architects on a great proportion of the new stations.

Space Heating in Ireland

THE Irish Electricity Supply Board has announced that it will not be able to permit the unrestricted use of electricity for space heating during the coming winter. It is considering the restrictions that it will be necessary to put into operation. If no restrictions are imposed, the Board says, it cannot guarantee a continuance of supply of power for industry, domestic cooking, hospitals, institutions and other essential uses, and it might have to resort to load shedding.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Electrical Components, Ltd.—In his statement which accompanies the report and accounts for the year to 31st March last, Mr. H. S. Seccombe (chairman and managing director) says that over a period of two years the amount required to finance stocks and debtors has risen by £150,000 and fixed assets by £65,000. The additional finance required to meet this increase has been provided partly by bank facilities, partly by retained profits, and partly by the new preference capital issued in February last, but the company is still under-capitalized for its present volume of trading, including the provision of necessary stocks and credit at present price levels. It is the directors' intention to make a further issue of preference shares towards the end of the present financial year. Mr. Seccombe refers to the probable contraction in the sale of certain major electrical appliances due to the rearmament programme and effect on sales of increase in purchase tax on radio and television sets, but an increase in the demand for television sets is anticipated with the opening of the stations at Holme Moss and in Scotland. The company has an increasing volume of turnover with industrial firms, and this business is expanding as a result of rearmament requirements. The first five months of the current year have shown a further satisfactory increase.

Ruston & Hornsby, Ltd.—In his circulated statement Mr. W. J. Ruston (chairman), after referring to the progress of subsidiary companies, says that during the year under review there was full employment in all departments and a further increase in output and dispatches. Reference was made in last year's report to the proposals for complete new ranges of engines, and some of these engines are now in production while others will follow shortly. The directors have decided to proceed into full production of their industrial gas turbine, but progress may be seriously retarded by the machine tool supply position. The value of orders outstanding on the books constitutes a record. Referring to replacement of machine tools, etc., acquired in pre-inflation days, and which should be replaced in the next eight years or so, Mr. Ruston says that, over and above original cost, £1,400,000 at least may be required. At the end of March, 1950, they had accumulated £350,000 in a plant replacement reserve and £200,000 has been transferred to this reserve from contingencies reserve, making £550,000, an estimate of the proportion of the total shortfall up to that date. The company intends to set aside £100,000 per annum to this reserve, but it may well be that this figure will need revising in the light of the trend of price levels in the next few years.

A. H. Hunt, Ltd., are making an issue of 100,000 4s ordinary shares at 10s each. They will be offered by means of provisional allotment letters to ordinary shareholders in the proportion of four for every 25 held. The issue has been underwritten by Kleinwort Sons & Co. for a commission of 1½d per share. The new shares will rank for any dividend whether interim or final which may be declared in respect of the year to 31st December next.

Aerialite, Ltd.—It is announced that nearly 99 per cent of the offer of 300,000 1s ordinary shares at 4s per share to ordinary stockholders was taken up. For the remaining shares, excess applications were received from 284 stockholders for over 300,000 shares. Such shares have been allotted by ballot.

James Howden & Co., Ltd.—At a meeting on 14th August, resolutions to effect the one-for-one scrip bonus and to convert the ordinary capital into stock transferable in multiples of 5s were passed.

The Calcutta Tramways Co., Ltd.—At meetings of ordinary and preference shareholders and the first debenture holders held on 15th August approval was given to the terms of the proposed agreement with the Government of West Bengal. The meeting of the second debenture stockholders was adjourned to 29th August owing to the absence of a quorum.

The London Electrical & General Trust, Ltd., reports a revenue for the year to 30th June last, after providing £25,266 for taxation, of £32,354, as compared with £25,645 for 1949-50. The proposed final dividend is 4½ per cent, making 6½ per cent which, the directors state, is the maximum the company will be allowed to pay on the ordinary stock if proposals in the White Paper for control of dividends are enacted. The total dividend for 1949-50 was 7 per cent.

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., states that the results for 1950 do not warrant the payment of

an ordinary dividend (against 7 per cent for 1949). The net profit for the year was £6,547 (against £21,422). The fall in the profit is attributed to continually rising costs which the company has been unable to pass on to the consumer. Application was made in May last to the Western Australia Electricity Commission to increase the power rates to bulk consumers and the result of that application is still awaited.

The English Electric Co., Ltd., has declared an interim dividend of 5 per cent (against 4 per cent).

Newton Brothers (Derby), Ltd., propose to pay a dividend for the past year of 13¾ per cent (against 15 per cent, which included a 5 per cent bonus).

The Chloride Electrical Storage Co., Ltd., is paying an unchanged interim dividend of 5 per cent.

New Companies

W. E. Burnand & Son, Ltd.—Registered 15th August. Capital £25,000. To acquire the business of an electrical engineer and manufacturer carried on by W. E. Burnand as W. E. Burnand & Son, at Sheffield. Directors: W. E. Burnand, Miss Lucille E. Burnand, Irene Burnand and J. W. Burnand. Regd. office: Duo Works, 66-106, Shoreham Street, Sheffield.

Tannoy, Ltd.—Registered 16th August. Capital £1,000. To acquire interests in any patents, brevets d'invention, licences, concessions, trade marks and the like relating to amplification, diffusion, re-diffusion, recording, production or use of sound, and any apparatus therefor, etc. Directors: G. R. Fountain (director of Tannoy Products, Ltd.) and M. H. Fountain (director of Tannoy Rentals, Ltd.). Regd. office: 348/352, Norwood Road, S.E.27.

Masterline Engineering Co., Ltd.—Registered 13th August. Capital £9,100. Precision and electrical engineers, tool makers, etc. Directors: J. S. Manuel, J. G. Carline and Col. V. C. Steer-Webster. Regd. office: 95, Park Lane, W.1.

Increases of Capital

Rheostatic Co., Ltd.—Increased by £150,000, in 100,000 6 per cent cumulative preference shares of 10s and 500,000 ordinary shares of 4s each, beyond the registered capital of £250,000.

Southern & Redfern, Ltd.—Increased by £25,000, in 20,000 ordinary and 5,000 redeemable preference shares of £1 each, beyond the registered capital of £25,000.

Aerialite, Ltd.—Increased by £75,000, in 60,000 £1 6 per cent cumulative redeemable preference and 300,000 1s ordinary shares, beyond the registered capital of £100,000.

Liquidation

Glynceiriog Electricity Supply Co., Ltd.—Winding up voluntarily. Liquidator, Mr. P. R. Hayes, Midland Bank Chambers, Wrexham.

Bankruptcies

D. Cromwell and **V. I. Cromwell,** trading as Cromwell & Co., at the rear of 76, High Street, Croydon, formerly at Hindsley Works, Hindsley Place, Forest Hill, London, S.E.23, electrical fittings and lampshade manufacturers and manufacturers of a food product.—Trustee, Mr. L. C. E. Webber, 14, Moorgate, London, E.C.2, appointed 10th August.

J. Cooper, lately carrying on business at Market Place, Orford, Suffolk, mechanical and electrical engineer.—First and final dividend of 4s 3½d in the £, payable 28th August at the Official Receiver's office, 13a, Great Colman Street, Ipswich.

E. S. Raney, formerly carrying on business at "Minstan," Coldyhill Lane, Newby, Scarborough, as an electrical engineer.—Receiving order dated 31st May, 1939, rescinded and order of adjudication, dated 31st May, 1939, annulled on 19th July, 1951, debts having been paid in full, together with 4 per cent statutory interest.

E. Cheetham, formerly carrying on business at 377, Ashton Old Road, Manchester, as an electrical contractor.—Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, 3, Official Receiver, released 14th August, 1951.

E. M. Swift, 10, Joinings Bank, Langley Green, Worcs, electrical engineer.—Last day for receiving proofs for dividend 4th September. Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 15th September.

CONYLITZ.—No. B697,625. Class 9. Insulated electrical litz wire and electrical apparatus included in Class 9 made from such wire.—Connollys (Blackley), Ltd., Blackley Vale Mills, Blackley, Manchester, 9.

TRANSVA.—No. 698,925. Class 9. Electrical apparatus and instruments included in Class 9.—Metropolitan-Vickers Electrical Co., Ltd., St. Paul's Corner, 1–3, St. Paul's Churchyard, London, E.C.4.

ECHOSONEL.—No. 699,315. Class 9. Supersonic echo-measuring apparatus for submarine sounding or for examination of materials.—Ateliers de Constructions Electriques de Charleroi, Brussels, Belgium. Address for service, c/o Feeny & Feeny, 2a, Charlwood Place, Westminster, London, S.W.1.

EAAL (design).—No. 689,371. Class 11. Fluorescent lighting apparatus.—Electrical Appliances & Accessories, Ltd., 345, Green Lanes, Harringay, London, N.4.

STOCKS and SHARES

THE early shock effects of the Gaitskell bombshell in the Stock Exchange markets have now disappeared. It is true that dividend limitation, or its possibility, is still very much of a factor in market calculations, but the slight amount of timid selling which followed immediately upon the speech of the Chancellor of the Exchequer, has given place to normally tranquil conditions. Investment refused to be panicked out of its securities.

Confidence Returning

There remains plenty of confidence in the assurance that, in spite of all its handicaps, British trade and commerce will go ahead, and that good dividends, even if they have to suffer some reduction now, will be resumed at the end of three years. Industrial companies, on the whole, continue to make a very fair showing in their reports and dividends. Electrical Components is one of the undertakings which contemplates a further issue. The company offered preference shares at the beginning of the present year, but the business, the chairman states, is still under-capitalized for its present volume of trading, and another issue of preference may possibly be made early next year.

Dividend Limitation

Prices have now settled down to a level which, while it fails to make for activity, is at least justified by the yields which are obtainable. At the back of the minds of most people is the expectation that the dividend limitation plan will not go through and that, even if it does, the provisions will be greatly modified and curtailed before the Bill becomes law.

Price Recoveries

Associated Electrical Industries and Automatic Telephones are both higher at 87s 6d and 70s respectively, while Lancashire Dynamo at 5 5/16 are 2s 6d up on the week. Telegraph Constructions are distinctly better at 43s 9d. Telephone Properties at 30s and Tube Investments at 6 7/16 show advances. Other rises include Lucas, 39s 6d, Allen West, 11s 3d and De la Rue, 37s. The " heavy " group has been in favour. Babcock & Wilcox at 76s 3d are 9d better. British Electric Traction deferred at 505 is 10 points to the good. In the radio section Cossors have strengthened to 13s 6d and Decca to 19s 6d. Something of a feature is a rise of 3s in English Electric to 65s 6d. Henley's hardened to 24s. General Electrics gained 2s 6d and C. A. Parsons 5s, to 92s 6d and 95s respectively.

A.E.I. " Eights "

Associated Electrical Industries 8 per cent preference shares have reacted from 40s to 37s 3d since the dividend control proposal, which, of course, affects the conversion offer now before stockholders. Under this, they have the right to convert their holdings into a new 4½ per cent preference stock, and, by way of compensation, to subscribe for ordinary shares at 20s (they are currently quoted at 87s 6d) in the proportion of three ordinary shares for every ten preference held. When the proposal was first framed, the price of the ordinary, at well over 90s, was related to the 20 per cent dividend paid this year, against 15 per cent previously. With the rate possibly to be controlled at 17½ per cent, and in view of the fall in the ordinary price, some adjustment has been necessary in the quotation for the preference, with the result noted above. As matters stand now, the " rights " to the ordinary, added to the value of the new 4½ per cent preference at par, are calculated to be worth about 3s more than the market price of the " eights."

Siemens and A.E.I.

In the general confusion, it became impossible to see what may have been the effect, on the shares concerned, of the recent news that A.E.I. have acquired the £450,000 ordinary stock of Siemens Brothers, for which the Custodian of Enemy Property had been inviting tenders. Siemens' chairman said earlier that the company had made an offer with a view to making the block of shares available to stockholders. A.E.I. is stated to have paid a figure above the market value, which is itself not far short of a million at the present price of 42s 6d. The quotation was around 45s towards the end of last month, and the reaction would presumably be due mainly to the possibility of the latest 10 per cent dividend being " controlled " down to 8½ per cent. A.E.I.'s statement anticipates a close and mutually advantageous association between the two companies.

Special Cases

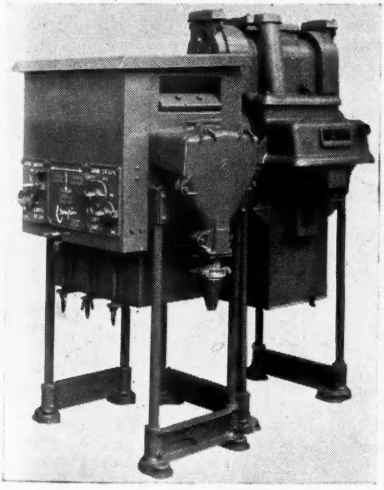
As it stands, the dividend restriction measure gives the Treasury discretion to make special dispensations in exceptional circumstances. One company at least is already contemplating the question of an application for the dividend to be raised, when the time comes, above the permitted limits. This is Venner Time Switches, Ltd., whose annual meeting will be held at the end of this month. The company has just emerged, with a 12½ per cent dividend, from a period of difficult trading conditions and small distributions, and would be penalized particularly by having to average the latest rate with the 5 per cent paid a year ago. The 5s shares are quoted at 7s 6d, having been valued at over 9s before the latest market complication.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

The new model 76A 7·6 cu ft English Electric refrigerator described in the *Electrical Review* of 10th August

Crompton Parkinson metalclad oil switch type A.R.A.2



Metalclad Oil Switches

TWO new designs of metalclad oil switches are now available from CROMPTON PARKINSON, LTD., Crompton House, Aldwych, London, W.C.2—type A.S.A.1, a feeder isolator, and type A.R.A.2, a ring main unit. Both units are for service voltages of 6·6 or 11 kV with a continuous load current of 400 A, and are designed for load breaking or making on to a fault of up to 250 MVA, and have a short-time thermal rating of 250 MVA for three seconds. They line up with the company's metalclad oil circuit breaker switchgear; the frame dimensions are the same so that they can be fitted in any position and changed for oil circuit breaker units when required.

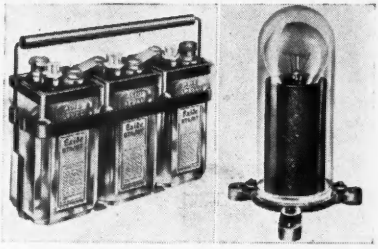
Electric Fence Battery

A battery which has been produced specifically for feeding most makes and types of electric fences is available from CHLORIDE BATTERIES, LTD., Clifton Junction, near Manchester. This Exide 3-DTG/NT battery comprises three 2 V cells which are assembled as a 6 V unit in a light metal carrier. The cell plates are of the "Mass" type which are suitable for duties where long discharges at low rates are required. When not in use, a freshening charge once every six months is sufficient to keep the battery in good condition.

Underwater Floodlight

Effective floodlighting of small decorative ponds, fountains, etc., can be carried out with ordinary 60 W lamps in fittings which are available from the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London,

Left: **Exide electric fence battery.** *Right:* **G.E.C. underwater floodlight**



W.C.2. They are designed on the diving bell principle, the air trapped under the outer well glass when the unit is submerged preventing the water from rising above the top of the inner casing which surrounds the lampholder. The body of the unit is of cast brass and is fitted with three fixing lugs. The cable enters through a gland and sealing compound is supplied with the unit to enable the user to make the entry airtight. Over 100 underwater floodlights of this type are in use on the South Bank site.

Electric Hoists

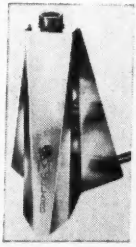
The TAYLOR STOKER CO., LTD., 189/191, Drummond Street, London, N.W.1, has made several improvements in the general design of its "Lo-Hed" hoists which are now embodied in the construction of a new series. Established features of the original model are maintained, including its low headroom feature which permits the load to be lifted until the hook is only about 12in from the underside of the beam. This meets most needs, but other designs have been developed to cater for specialized requirements. There is a certified flameproof model for operating in explosive or inflammable atmospheres, a foundry type for lifting ladles of molten metal, a dye-house type suitable for operating in steamy atmospheres over treatment tanks, and a high-lift hoist.

Storage Block Steam Raiser

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has increased its range of storage block steam raisers/water heaters by introducing model HO. 5104, which has a loading of 2 kW for the steam raiser and 2 kW or 3 kW for the 50 gall copper lined water heater. This equipment provides steam and hot water at predetermined times, operation being controlled automatically. Its principal use is for sterilizing recorder milking plant, although it may also be used for other applications in dairies.

Ultrasonic Soldering Bath

The rapid tinning of small aluminium and aluminium alloy articles is made possible by an ultrasonic soldering bath recently introduced by MULLARD, LTD., Century House, Shaftesbury Avenue, London, W.C.2. It has been specifically developed for the soldering of small and complex shaped parts, foils, wire and tubes, which cannot easily be handled by the Mullard ultrasonic soldering iron. The bath operates from the power pack supplied for the soldering iron and comprises a small soldering bath $\frac{7}{8}$in in diameter and $\frac{3}{8}$in deep. This is heated by a conventional resistance winding and the molten solder in the bath is agitated ultrasonically by a magnetostriction transducer composed of a stack of iron alloy laminations. A control switch on the front of the unit enables the ultrasonic energy to be applied at will.

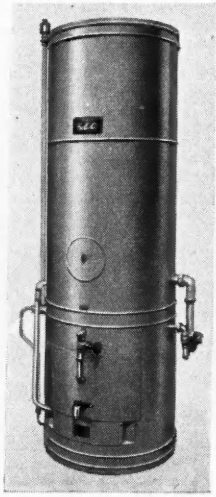


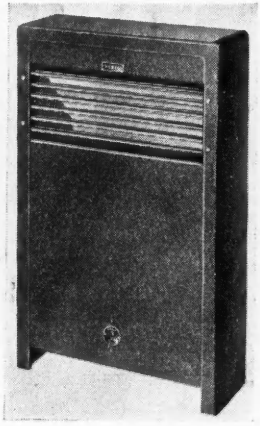
Mullard ultrasonic soldering bath

Convection Heaters

A new range of "Deren" convector heaters produced by DE RENZI HOLMES & CO., LTD., Fox's Lane, Wolverhampton, is constructed in sheet steel, stove enamelled in bronze, cream and ripple black, other colours being supplied to special order. The heating elements consist of nickel chromium wire wound on mica, enclosed in heavy machined cast-iron clamping plates. Black heat is induced through an internal cowl and chromium plated grill, so that the actual convector case remains quite cool. With the built-in thermostat fittings, air temperature can be maintained between 50 deg F and 70 deg F according to the requirements of the particular case.

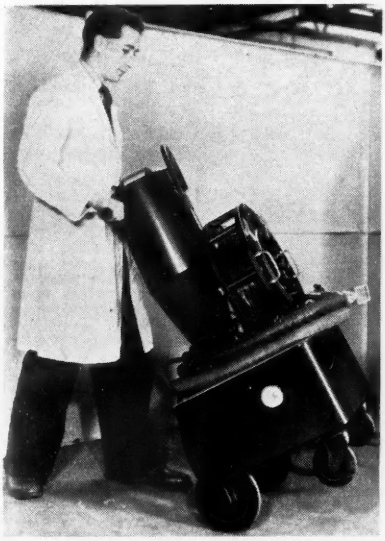
The 1 kW model, which measures 20$\frac{1}{2}$in by 14in by 5$\frac{1}{2}$in, sells at £6 2s (plus £4 9s 8d P.T.). The price of the 2 kW unit (28$\frac{1}{2}$in by 18$\frac{1}{2}$in by 6$\frac{1}{2}$in) is £9 7s 6d (£6 17s 10d P.T.), while that of the 3 kW heater (27$\frac{1}{2}$in by 25$\frac{1}{2}$in by 6$\frac{3}{4}$in) is £13 13s (£10 0s 7d P.T.). Every heater carries a twelve months' guarantee.





Left: **G.E.C. storage block steam raiser.** *Below:* **"Deren" convector heater**

Submerged Arc Welding



Quasi-Arc "Unionmelt" D.S.-F welder

Below (*Left*): **Butt welding with the D.S.-F flexible welder**

(*Right*): **Tilted fillet welded on jigged component**

THE "Unionmelt" welding process developed by the Quasi-Arc Co., Ltd., is stated to be employed by almost all British manufacturers of pressure vessels as well as being in everyday use for shipbuilding, constructional work and many other applications.

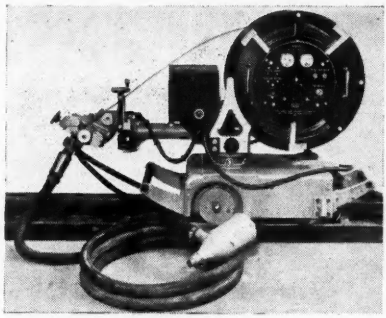
Submerged melt welding has been evolved over the past fifteen years principally as a fully-automatic process, the seam to be welded being moved beneath a stationary welding head through which is fed the coil of electrode wire and the powdered flux, or, alternatively, the automatic head can be mounted on a self-propelled carriage for traversing the seam to be welded. Developments have been introduced by means of which the process can be used semi-automatically or as a manual tool to be positioned and guided by the welding operator.

Manual equipment is now in general use and two types are available. The first of these is the D.S.-F welder operating at welding currents up to 900 A; the welding wire and the flux are fed down a 20ft flexible tube to a small tool held by the operator. The equipment is portable and the tank on the plant itself contains 75 lb of flux which is fed as required by compressed air down the flexible hose, providing enough flux for a day's work. The 25 lb coil of $\frac{3}{32}$in or $\frac{1}{8}$in diameter wire is mounted on the plant and is also fed down the hose, the rate of feed being automatically controlled to maintain a constant arc length. A remote control push-button starting and stopping device, which incorporates a switch for inching

the wire forward or backward in the hose, is provided so that the operator can control the operation of the plant from the point of welding.

The machine can stand on the shop floor, with the operator welding at floor level or higher than the machine itself. A single point lifting eye enables it to be slung over a welding area with the hose leading down to the operator, who is able to work freely within a radius of 15 to 20ft. Alternatively, the plant can be suspended from a wall-mounted jib crane thus enabling the welder to operate freely in the wider area covered by the radius of the jib.

A "Unionmelt" flexible attachment is also available with the standard D.S. head. Here $\frac{3}{32}$in or $\frac{1}{8}$in diameter wire is fed down the 20ft flexible hose and there is a small hopper on top of the welding head which is kept filled with flux (about 3·5 lb). While the hose on this type of flexible unit is less bulky than that with the D.S.-F welder (because there is no flux fed down the hose) this attachment has the disadvantages of the extra weight in the head because of the hopper and the frequent replenishing of flux which is necessary. Welding is from three to seven times faster than with the normal covered electrode manual arc welding methods. Seams to be welded must be in the flat position; butt welds, vee welds or horizontal-vertical fillet welds



Flexible attachment for manual welding with standard D.S. automatic welding head

can be made simply and quickly; horizontal-vertical fillet welds can be made in one run up to $\frac{3}{8}$in leg length. Welding operators can also be trained quickly to produce welds of quality by this method. Set-up and fit of joints to be welded must be to good standards, as is necessary for best results with any type of submerged arc welding.

Ministry of Works

Activities in 1950

IN the course of its report for 1950 (Cmd. 8306, H.M. Stationery Office, 1s 6d) the Ministry of Works mentions the institution of a national apprenticeship scheme by the Apprenticeship and Training Council for the Electrical Contracting Industry. An appendix to the report shows that the total number of electricians in the building industry was 57,152 and that the number of apprentices in May, 1950, was 15,863, 6,223 having entered in the period from August, 1948, to May, 1950.

It is noteworthy that of the 10,703 registrations under Defence Regulation 56AB at May, 1950, no fewer than 8,243 related to electrical contractors.

In a section on the supply of building materials and equipment it is said that there was a marked increase in the number of gas appliances produced as compared with 1949. There were, for instance, increases of 30 per cent in the number of fires and 25 per cent in the number of water heaters. In another appendix, production figures are given. For gas it is shown that the output in 1950 was:—Cookers 814,600; wash boilers 400,800; water heaters 185,600; and meters 1,384,100. For electricity the figures were:—Cookers 274,500; wash boilers 126,600; immersion heaters 190,900; and meters 1,403,500.

Included in the surplus stores disposed of by the Ministry were electrical accessories to the value of £19,000 (against £10,000 during 1949); from August, 1944, to the end of 1950, £225,000 has been obtained from the sale of surplus electrical accessories.

Reference is made in the report to the start of work on two new atomic energy establishments at Capenhurst and Aldermaston; further work carried out at Harwell; the completion of two wind tunnels, at the National Aeronautical Establishment, Bedford, and the Royal Aircraft Establishment, Farnborough; the improved lighting system at the National Gallery; and the completion of the new Chamber for the House of Commons.

E.A.W. Annual Conference

The twenty-seventh annual conference of the Electrical Association for Women is to be held at Scarborough from 19th to 24th May, 1952. Programmes and invitations will be sent out in due course.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) will be obtainable after 3rd October, from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1947

15565. Smith & Sons (England), Ltd., S., and Meredith F. W.—Automatic control systems. 10th June, 1948. (658246.)

17027. Western Electric Co., Inc.—Compressional wave transmission devices. 27th June, 1947. (658177.)

22767. Western Electric Co., Inc.—Wave transmission systems and apparatus. 15th August, 1947. (658178.)

27573. Guyot, G. J. L., and Gillet, P.—Method and means for measuring the microphonic action of multi-electrode tubes. 14th October, 1947. (658253.)

30223. Akt.-Ges. Brown, Boveri, & Cie.—Magnetic induction accelerator. 13th November, 1947. (658255.)

34739. Metropolitan-Vickers Electrical Co., Ltd.—Cathode-ray tube circuit arrangements. 30th December, 1947. (658257.)

1948

199. Duffy, V. A.—Methods and apparatus for welding thermoplastic articles. 2nd January, 1948. (658258.)

5978. Director of the Office of Technical Services, Department of Commerce.—Thermionic valve oscillator circuits for high-frequencies. 27th Feb, 1948. (658265.)

6001. Director of the Office of Technical Services, Department of Commerce.—Radio-frequency mixer circuits. 27th February, 1948. (658266.)

6315. Sylvania Electric Products, Inc.—Electric glow relay. 28th February, 1948. (658187.)

10764. Igranic Electric Co., Ltd.—Apparatus for controlling the energization of a number of electro-responsive windings. 19th April, 1948. (658272.)

12819. British Thomson-Houston Co., Ltd.—Electric circuit-breakers. 10th May, 1948. (658274.)

14521. Radio Corporation of America.—H.f. oscillator rectifier systems for high-voltage direct-current power supply. 28th May, 1948. (658277.)

19118. Warner & Swasey Co.—Variable-speed electric drives. 16th July, 1948. (658282.)

20896. Stanley, V. A.—Cathode-ray tubes. 5th August, 1949. (658287.)

20988. Ball, J.—Electronic timer. 9th August, 1948. (658288.)

22293. Smith's Electric Vehicles, Ltd., and Heyman, H. W.—Brakes for electrically-propelled vehicles. 24th August, 1949. (658290.)

23839. Standard Telephones & Cables, Ltd.—Multiple switch, such for example, as is used for establishing a number of connections in an automatic telephone exchange. 10th September, 1948. (658295.)

25162. Bendix Aviation Corporation.—Electrical transformers. 27th September, 1948. (658297.)

25646. Radio Corporation of America.—Methods of, and means for, stabilizing or determining microwave frequencies. 1st October, 1948. (658198.)

27150. Felgate Radio, Ltd.—Loudspeakers adapted for use in television and like apparatus. 22nd November, 1949. (658103.)

27277. British Thomson-Houston Co., Ltd.—Vehicle radio control. 20th October, 1948. (658105.)

29341. British Thomson-Houston Co., Ltd.—Selective sideband transmission and reception systems. 11th November, 1948. (658111.)

29923. General Electric Co., Ltd., and Williams, C. E.—Circuit arrangements for operating electric discharge lamps. 15th November, 1949. (658113.)

1949

5830. National Research Development Corporation.—Electronic valve circuits. 2nd March, 1950. (658308.)

6738. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Cross-bar switches for use in automatic telephone systems. 11th March, 1949. (Addition to 647506.) (658210.)

7483. General Electric Co., Ltd., and Sowter, A. B.—Tools for cold pressure welding. 21st December, 1949. (658211.)

7538. Winther, M. P.—Toroidal magnet fields for dynamo-electric machines. 19th March, 1949. (658311.)

8324. Williams, H. M.—Rotary electrical regulating apparatus. 28th March, 1949. (658123.)

8370. British Thomson-Houston Co., Ltd.—Aluminium alloys. 28th March, 1949. (658124.)

8659. British Thomson-Houston Co., Ltd.—Capacitors. 30th March, 1949. (657951.)

8714. Mestitz, E.—Conducting liquid electric devices for performing switching operations in repeated succession. 31st March, 1949. (657952.)

8715. Mestitz, E.—Conducting liquid electric devices for making and breaking in repeated succession electric load circuits. 31st March, 1949. (657953.)

9617. British Thomson-Houston Co., Ltd.—Clothes-washing machine. 8th April, 1949. (657967.)

10349. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Circuit arrangements for passing a signalling voltage under the control of an auxiliary voltage. 19th April, 1949. (657972.)

10466. Holstensson, A. H.—Tuning device of a radio apparatus or a similar apparatus. 20th April, 1949. (Cognate application 10467, 23rd April, 1948.) (657975.)

10815. Hain, F. B. L.—Electromagnetic relay systems. 23rd April, 1949. (658025.)

11355. Sangamo Weston, Ltd.—Electrical instruments. 28th April, 1949. (658125.)

11657. British Thomson-Houston Co., Ltd.—Quartz-to-metal seal. 2nd May, 1949. (658218.)

11774. Devereux, F.—Couplings for electrical leads applicable also to pipes and shafts. 3rd May, 1949. (657986.)

12135. Sanick, I. H.—Method of the electrical conductivity of soil. 6th May, 1949. (657989.)

12527. Westinghouse Brake & Signal Co., Ltd., and King, K. G.—Electric relays. 5th April, 1950. (658130.)

12580. British Thomson-Houston Co., Ltd.—Barretters. 11th May, 1949. (658038.)

13005. British Thomson-Houston Co., Ltd.—Lubricating arrangements for high-speed shafts. 16th May, 1949. (658044.)

13115. Westinghouse Electric International Co.—Magnetic core structures for electrical induction apparatus. 17th May, 1949. (658135.)

13530. Patelhold Patentverwertungs- & Elektroholding Akt.-Ges.—Arrangement for variable coupling of electric oscillation circuits. 20th May, 1949. (658137.)

13863. General Electric Co., Ltd., and Gilchrist, D. C.—Electric phase-shift networks. 2nd June, 1949. (Divided out of 658192.) (658223.)

14893. General Electric Co., Ltd., and Gilchrist, D. C.—Servo systems of the closed-loop type. 31st May, 1949. (658192.)

15369. Schmidt, G.—Thermostatically-controlled electric heater for liquid or semi-liquid substances. 9th June, 1949. (658148.)

15397. British Thomson-Houston Co., Ltd.—Apparatus for the demarcation of fluids in pipe lines. 9th June, 1949. (658149.)

15425. Mond Nickel Co., Ltd.—Electrolytic refining of metals. 9th June, 1949. (658150.)

15819. Mallory & Co., Inc., P. R.—Circuit-controlling device. 14th June, 1949. (658155.)

16548. Scholes & Co., Ltd., G. H., Pearce, F. J., and Pearce, G. S.—Terminal connections for electric switches and other electrical apparatus. 12th November, 1949. (658159.)

17437. Westinghouse Electric International Co.—Electromagnetically operated switches. 1st July, 1949. (658165.)

17485. British Thomson-Houston Co., Ltd.—Valve amplifiers. 1st July, 1949. (658167.)

17488. British Thomson-Houston Co., Ltd.—Compressors. 1st July, 1949. (658004.)

17862. British Thomson-Houston Co., Ltd.—Electrical immersion heaters. 6th July, 1949. (658006.)

18686. S.E.D.E.M. Soc. d'Etude et de Distribution de Matériel Electromécanique.—Electric measuring instruments. 15th July, 1949. (658170.)

19521. British Thomson-Houston Co., Ltd.—Quartz-to-metal seals. 25th July, 1949. (658227.)

19541. Isbister, J.—Electric heating elements and method of making same. 25th July, 1949. (Cognate application 19542, 19th July, 1949.) (658066.)

19922. Williams, L.—Electrically heated hair combs. 29th July, 1949. (658068.)

20754. Widakowich, M. — Electromagnetically operated current interrupters. 9th August, 1949. (658073.)

24385. Electrix, Ltd., and Patchett, G. W.—Vacuum cleaners. 22nd September, 1949. (658328.)

24792. Landis & Gyr Soc. Anon.—Manufacture of electric coils. 27th September, 1949. (658228.)

24806. Harris, J. T. (Richard & Ammann Soc. Anon.).—Cutting heads for electric dry shavers. 27th September, 1949. (658229.)

25004. Babcock & Wilcox, Ltd.—Vapour generating and superheating units. 29th September, 1949. (658092.)

25378. British Thomson-Houston Co., Ltd.—Coffee-making apparatus. 3rd October, 1949. (658230.)

27270. British Thomson-Houston Co., Ltd.—Connecting rod assemblies. 24th October, 1949. (658233.)

28959. Philips Electrical, Ltd., and Robbins, E. R.—Spot-lights. 11th November, 1949. (658236.)

Amended Specifications

599611. Sperry Gyroscope Co., Inc.—Frequency control apparatus.

632942. Western Electric Co., Inc.—Rectifiers and methods of making them.

639556. Bendix Aviation Corporation.—Frequency multiplier.

Electricity in South Africa

From Our Cape Town Correspondent

HEAVY equipment for the South African Electricity Supply Commission's station at Vierfontein, to serve the Orange Free State gold mines, has started to arrive at Durban from Great Britain. It includes the first of 36 hollow-forged boiler drums, weighing from 30 to 40 tons. The transport of some of the equipment to the Orange Free State will present difficult problems and equipment which cannot get through railway tunnels may have to go by road. Sir George Usher, chairman of International Combustion (Africa), Ltd., said that because of Durban's ability to handle such lifts, it had been decided to ship them through this port. All the equipment for the station imported from overseas would be handled in Durban.

Sir George said that much of the material to be used in the Vierfontein power station would be made in Port Elizabeth by a recently established engineering works. As time went on more and more of the equipment for power stations in this country would be manufactured in the Union, using South African labour and almost entirely local materials. The largest travelling grate " L " type louvre mechanical stoker in the world has been manufactured in Port Elizabeth from South African materials. It is the first of twelve stokers ordered by " Escom " for the Vierfontein station. In addition, four stokers are to be manufactured in Port Elizabeth for the new Cape Town power station. To overcome the shortage of skilled labour in the Union 40 specially skilled artisans are being brought to Port Elizabeth to expedite the work of building the urgently required power plant.

The Administrator of the Transvaal has approved a request by the Johannesburg City Council to borrow £7,000,000 for a new power station. The initial cost of the station is estimated at £6,351,000 but an additional £577,000 will be kept aside for an expected 10 per cent increase in the cost of plant and equipment by the time the orders are placed.

Good orders are being received by South African manufacturers for electric cables, particularly from the Rhodesias, and production continues at normal levels as satisfactory supplies of raw materials are now being obtained by these factories.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—MELBOURNE.—12th September. Victorian Railways Commissioners. Supply of cable. (C.R.E. (I.B.) 68017/51. Ten/2816.)*

BRISBANE.—24th October. State Electricity Commission of Queensland. Supply of outdoor circuit breakers for the Capricornia Regional Electricity Board. (C.R.E. (I.B.) 68078/51. Ten/2822.)*

18th October. City Electric Light Co., Ltd. Two-way radio telephone communication system. (C.R.E. (I.B.) 68387/51. Ten/2838.)*

Bacup.—3rd September. Corporation. Street lighting equipment. (See 17th August issue.)

Basingstoke.—3rd September. Corporation. Fluorescent street lighting. (See 17th August issue.)

Bingley.—5th September. U.D.C. Street lighting installation. (See 17th August issue.)

Blackpool.—22nd September. Corporation. Street lighting equipment. (See this issue.)

Chichester.—31st August. City Council. Five automatically controlled, electrically driven, pumping units and auxiliaries for water supply to West Dean, East Dean and Singleton. Water Engineer's Office, Greyfriars, North Street.

Egypt.—CAIRO.—27th September. Director General, Cairo Electricity & Gas Administration. Supply of seventy 300 kVA and thirty 150 kVA transformers. (See this issue.)

Gillingham (Kent).—3rd September. Corporation. Electrical installation in 250 houses. (See 17th August issue.)

10th September. Electrical installations in 33 flats. (See 17th August issue.)

Manchester.—3rd September. Waterworks Committee. Electric control and supply cables. (See 17th August issue.)

Market Harborough.—24th September. U.D.C. Electric street lighting. (See this issue.)

Middlesex.—8th September. County Council. Supply of electric lamps for one year from 1st November, 1951. (See this issue.)

New Zealand.—WELLINGTON.—5th September. Director General (Stores Division), General Post Office. Supply of 550 condensers. (C.R.E. (I.B.) 68081/51. Ten/2827.)*

3rd October. Post & Telegraph Department. Supply of telephone cable. (C.R.E. (I.B.) 68084/51. Ten/2819.)*

Romford.—10th September. Corporation. Street lighting equipment. (See 17th August issue.)

South Africa.—JOHANNESBURG.—13th September. Municipality. Meters, transformers and time switches. (C.R.E. (I.B.) 68439/51. Ten/2837.)*

Tavistock.—14th September. Urban District Council. Street lighting for main roads and shopping centre Specification and drawing (deposit two guineas) from the Clerk of the Council, Council Chambers, Drake Road.

Uruguay.—MONTEVIDEO.—11th September. Administracion General de las Usinas Electricas y Telefonos del Estado. Supply of 18,000 1½ V dry cells. (C.R.E. (I.B.) 67189/51. Ten/2824.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

ORDERS PLACED

Bideford. — Corporation. Street lighting equipment in various county and district roads (£3,517).—Revo Electric Co., Ltd.

Bournemouth.—Corporation Highways and Works Committee. Street lighting lanterns in Alma, Richmond Park and Hinton Roads and in Queen's Park Avenue (£4,158).—Revo Electric Co., Ltd.

Newcastle - on - Tyne. — Corporation. Accepted. Installation of electricity in place of gas in Council houses in the City (£5,295).—Bernard Berrie.

Walsall.—Corporation Property Committee. Re-wiring of the Council House (£11,072).—Troughton & Young, Ltd.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Amble.—Two schools; county architect, County Hall, Newcastle.

Ashington.—Outpatients' department at Ashington Hospital for the Hospital Board (£11,000); Dodds & Son, builders, Morpeth (in place of tender withdrawn).

Atcham.—Houses (40) at Ford for R.D.C.; Shutt & Co., Wolverhampton.

Birmingham.—Multi-type school, junction of Garretts Green Lane and Sheldon Heath Road, Sheldon; H. J. Manzoni, city engineer.

Blackburn.—Alterations and extensions at Royal Infirmary (£19,000); T. Duffy, architect, Sunlight House, Quay Street, Manchester.

Blackpool.—Houses (52), Tyrone Avenue; R. Fielding & Son, Ltd., Stanhope Road Works.

Bourton-on-the-Water.—Secondary school (£140,000), for E.C.; county surveyor, Gloucester.

Bridgnorth.—Shops, maisonnettes, and lock-up garages, etc., Woodhill site, Highley; J. Penberthy, architect, 74, Bath Road, Wolverhampton.

Caernarvon.—Houses (100) at Llys Meirion estate; J. J. Feaver, surveyor.

Chelmsford.—Three blocks of flats, Sunningdale Road; Chelmsford West End Properties, Ltd., 23, Highfield Road. Warehouse, Hall Street; Stevens, Dray & Co., Ltd., Mildmay Road.

Clitheroe.—Dwellings (44) at Lower Moor Site No. 2 for T.C.; Gregory Flats, Ltd., Worthing.

Durham.—Houses at Belmont (30), Seamside (12), and Witton Gilbert (20); R.D.C. surveyor, Byland Lodge.

Elland.—Houses at Greetland (30), and Stainland (18); F. R. Birkhead, surveyor.

Leamington Spa.—Fire station and fire brigade headquarters, Beach Lawn site, Warwick Street; county architect, Warwick.

Leeds.—Departments of engineering and building, as first section of new technical college (£2,000,000); city architect, Priestley House, Quarry Hill, 9.

Leek.—Garden suburb of 600 houses (£1,000,000); U.D.C. surveyor.

Liverpool.—Extensions to premises, for W. & R. Jacob & Co., Ltd., biscuit manufacturers, Aintree; Ormrod & Banister, architects, 49, Rodney Street.

London.—Battersea.—X-ray Department at Bolingbroke Hospital; A. G. Roberts, architect, 76, Wimpole Street, W.1.

Plaistow.—Maisonnettes (30), Grange Road, for West Ham B.C.; Thomas E. North, architect, 70, West Ham Lane, E.15.

Stepney.—Aged persons' hostel, Beaumont Square; James & Bywaters, architects, 5, Bloomsbury Street, W.C.1.

Hampstead.—Dwellings (163), Broadhurst Gardens, N.W.6; P. H. Harrold, town clerk, Haverstock Hill, N.W.3.

Middlesbrough.—Warehouse, Thompson Street for French & Son; Kitching & Co., architects, 21, Albert Road.

Construction bays and gantries, South Bank Road for the Tees-side Bridge & Engineering Co., Ltd.

Newcastle-on-Tyne.—Flats (1,000), Longbenton, 200 houses, Montagu estate, 120 flats and maisonnettes, Hindhaugh Street; city architect, 18, Cloth Market.

Flats (282), Slateyford estate; G. Wimpey & Co., Orchard House, Jesmond.

Houses (200) at West Denton; J. T. Bell & Son, 7, Northumberland Place.

Mineral water factory, Condercum Road for St. James' Products; M. Gatoff, architect, Trafalgar Street.

Secondary school, West Road for the E.C.; city architect, 18, Cloth Market.

Orrell.—New branch library for Lancs C.C. (£10,760); Nixon & Boardman, Ltd.

Peterlee (Co. Durham).—Houses (440) at Eden Lane, Hordem for the Peterlee Development Corporation, Shotton Hall, Castle Eden; Corporation architect's department.

Preston.—Houses (87), Blackpool Road, Larches estate; W. E. E. Lockley, town clerk, Municipal Building.

Prudhoe-on-Tyne.—Houses (110) for U.D.C.; J. Angus, Lovaine Place, Newcastle.

Reading.—Garage, workshops, offices and stores, Vastern Road; Reading Automobiles, Ltd., 13/15, Caversham Road.

Rhosesmor.—Junior and infants' school, for Flintshire E.C.; W. Griffiths, architect, Llwynegrin, Mold.

Richmond (Surrey).—Houses (193), Sandy Lane site, Petersham; borough surveyor, Hotham House, Heron Court.

Saddleworth.—Houses (50) at Carr Lane, Greenfield for U.D.C.; W. G. West, Ltd., Stockport.

Sale.—Dwellings (70) at Baguley Lane for B.C.; F. Entwisle & Co., Ltd., Broadway, Davyhulme.

Salford.—Rebuilding of St. John's Methodist Church, Weaste; Halliday & Agate, architects, 14, John Dalton Street, Manchester.

Shoreham.—Junior and infants' school (£59,750), for West Sussex E.C.; F. R. Steele, county architect, County Hall, Chichester.

South Shields.—Extensions to works; True Shapes, Ltd., Riverside.

Stockton - on - Tees.—Church grammar school; Rev. R. T. Heselton, chairman of promoters, 6, Yarm Road.

Houses (170) at Roseworth for the T.C.; Lane, Fox & Co., builders.

Houses and bungalows (62) at Roseworth for the T.C.; G. Fordy & Son, builders.

Stretton.—Houses for the Admiralty; J. R. Ashall, Ltd., builders, Greenway, Manchester Road, Padgate, Warrington.

Usk.—Rebuilding court room, new cells, etc., at Sessions House, for County Standing Joint Committee; C. L. Jones, county architect, Queen's Hill, Newport, Mon.

Wakefield.—Houses (40) for R.D.C.; Duncan Mann & Sons, Kirkhamgate.

Warrington.—Factory extensions for N. Greening & Sons, Ltd., Bewsey Road; Plans by own staff.

Wisbech.—Administrative and workshop blocks, laboratories, classrooms, dining room, kitchen, etc., as first section of college of further education, for Isle of Ely C.C.; R. D. Robson, county architect, County Hall, March, Cambs.

Workington.—Grammar school at Schoose for Cumberland C.C.; J. H. Haughan, county architect.

Worthing.—Flats at Ivydore Avenue (80), Ringmer Road (52), and Warner Road (20), for T.C.; E. G. Townsend, town clerk, Town Hall.

York.—Houses (200 each) at Moor Lane estate and Askham Lane estate; Chas. J. Minter, city architect, Guildhall.